The Impact of Childhood Sexual Abuse on Adult Sleep

by

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Abstract

The present study examined the role of childhood sexual abuse (CSA) in adult sleep. Specifically, it investigated why those with histories of CSA are more likely to have disrupted sleep by examining two possibilities. First, the present study explored whether sleep disturbances are due to a generic effect of trauma or if they are unique to CSA. Second, the present study also examined trauma experienced after childhood as a possible mediator of the relation between CSA and adult sleep quality, as those with histories of CSA are more likely to experience subsequent adult abuse/trauma. The present study is an improvement to the current literature in terms of measurement as it used not only more thorough measurement by use of several sleep questionnaires, but also better quality of measurement by using measures with psychometric data. Likewise, it is an improvement in terms of sample and methodology as it used a large, non-clinical, community sample and included comparisons to other forms of abuse/trauma. Participants recruited from Mechanical Turk (n = 403) completed measures regarding childhood abuse/trauma, post-childhood abuse/trauma, and sleep. As hypothesized, those who experienced CSA were found to have poorer overall sleep than non-abused peers; however, they were not significantly different from those who experienced physical abuse only or sexual and physical abuse. Post-childhood trauma was found to act as a full mediator of sleep duration and habitual sleep efficiency, and a partial mediator of overall poor sleep quality, subjective sleep quality, sleep disturbances, daytime dysfunction, disruptive nocturnal behaviours, sleep paralysis frequency, sleep apnea, insomnia, narcolepsy, RLS/PLMD, nightmares, nightmare frequency, factors influencing sleep, and impact of sleep complaints on daily functioning. In sum, these findings are largely consistent with prior theory, suggesting that adult sleep disturbances following CSA are due to a generic effect of trauma, and add to our understanding of why CSA is related to disrupted adult sleep by introducing post-childhood abuse or trauma as a mediating variable.

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List of Acronyms and Abbreviations

CSA	Child Sexual Abuse
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICSD	International Classification of Sleep Disorders
NDQ	Nightmare Distress Questionnaire
NREM	Non-Rapid Eye Movement sleep
PSQI	Pittsburgh Sleep Quality Index
PSQI-A	Pittsburgh Sleep Quality Index Addendum for PTSD
PTSD	Post-Traumatic Stress Disorder
REM	Rapid Eye Movement sleep
S50	SLEEP-50 Questionnaire
WUSEQ	Waterloo Unusual Sleep Experiences Questionnaire-VIIIa

Introduction

Sleep disturbance is well documented following traumatizing events (Ellis, Stores, & Mayou, 1998; Kato, Asukai, Miyake, Minakawa, & Nishiyama, 1996; Mellman, David, Kulick-Bell, Hebding, & Nolan, 1995). Pillar, Malhotra, and Lavie (2000) add that such disturbance may be a normal response to stress. Noll, Trickett, Susman, and Putnam (2006) go on to suggest that sleep may be particularly disturbed by sexual abuse as it often occurs in places where experiencers must subsequently continue to sleep, so that lack of sleep safety contributes to longstanding sleep disruption. A recent review by Steine et al. (2012) confirms that it is well established that adult sleep disturbance is greater in sexually abused than non-abused persons. The authors also note a number of problems with the research to date, some of which the present study addresses. The review by Steine et al. (2012), including its recommendations for future research, is foundational to the present investigation, which aims to advance our understanding of why childhood sexual abuse leads to poor sleep in adulthood. In particular, I examined two questions: 1) whether sleep disturbance is a merely generic effect of trauma or something unique to sexual abuse, and 2) whether that relationship between sexual abuse and sleep disturbance is at least partially due to repeated trauma.

In the following, I first address the problems of defining and measuring childhood sexual abuse, and then examine the prevalence and sequelae of child sexual abuse, which not only include poorer psychological, behavioural, and health outcomes, but also disordered sleep. I then turn to the relation between childhood sexual abuse and sleep disturbance, highlighting research in children, adolescents, and adults. Because the present research is driven by a desire to understand whether sleep disturbance is a generic effect of trauma, I then review the extant literature that draws comparisons between those who experienced childhood sexual abuse, those

who experienced childhood physical abuse, and those who experienced no childhood abuse, with a focus on adult sleep –general sleep disturbance as well as specific disorders (e.g., insomnia, parasomnias). Lastly, I review what is known regarding the connection between experience of childhood abuse and subsequent adult sexual assault.

Definition and Prevalence of Sexual Abuse

There is no universal definition of sexual abuse; however, within the psychological literature definitions fall into two broad categories. The first focuses upon the sexual acts perpetrated, while the second emphasizes subjective experience by asking participants if they have been sexually abused. Some studies using definitions that focus upon the sexual acts also differentiate between abuse occurring with and without genital contact. Some definitions require genital contact for the experience to be designated sexual abuse (e.g., Briere & Runtz, 1987; Trickett, Noll, Reiffman, & Putnam, 2001; Wolfe, Gentile, & Wolfe, 1989); however, imposing a definition tied to perpetrated sexual acts may fail to account for the experience of the person who has been abused. What one person may regard as upsetting, another may regard as deeply traumatizing. It is for this reason that some studies rely on subjective experience, recognizing that it may be more relevant to outcome than external characteristics of the abuse. As such, it may be the reaction of the person that drives sleep disturbance symptomatology. Accordingly, the present study adopts a broad, subjective definition of sexual abuse in which participants are asked if they have been sexually abused. However, to document their actual experiences, data is also collected regarding specific sexual behaviours experienced by participants.

The debate on how to define sexual abuse understandably adds to the complexity of research on sexual abuse; likewise, issues involved in defining *childhood* further muddy the research waters. Child sexual abuse (CSA), as its name suggests, is sexual abuse that occurs

during childhood; however, “childhood” is defined differently in law, in research, and in different locales. Many definitions regard children as those under the age of consent; however, even in North America, there is significant variation in this age. For example, in the United States of America, age of consent varies from 16 to 18 at the state level (Hasinoff, 2015). Additionally, age of consent can change over time. Canadian Parliament voted to increase the national age of consent from 14 to 16 in 2007 (Dauda, 2010). Given the lack of consensus, the present research employs the term “childhood”, allowing participants to determine if abuse occurred at a point during which they identified as a child. However, I also ask at which age or ages the abuse occurred.

In addition to the variance in age of consent, the age of the child in relation to offender is sometimes taken into consideration to distinguish between peer sexual activity and other exploitative sexual activity. For example, it is common for CSA research to require the perpetrator to be at least five years older than the abused (e.g., Briere & Runtz, 1987; Duval, McDuff, & Zadra, 2013), although not all studies require an age differential (e.g., Finkelhor, Hotaling, Lewis, & Smith; Gal, Levav, & Gross, 2011). However, Shaw et al. (2000) found that while children abused by other children are younger and more likely to be boys, they are not significantly different from those abused by adults in regard to the manifestation of emotional and behavioural problems. Thus, the present study does not require an age differential.

Even with such variability in definitions, all findings point to the same conclusion: CSA is widespread. A recent review by Kajeepeta, Gelaye, Jackson, and Williams (2015) identified CSA as the most common of adverse childhood experiences. Early research established CSA as an international concern: A 1994 study that spanned at least 21 countries reported prevalence rates of between 7% and 36% for women and between 3% and 29% for men (Finkelhor, 1994).

Cosentino and Collins (1996) found that CSA was far more variable for girls than for boys, with prevalence rates ranging 6-62% for girls and 3-16% for boys. More recent estimates indicate that 20-33% of women experienced CSA (Fairweather & Kinder, 2012; Seng, Sperlich, & Low, 2008). Further, a recent worldwide meta-analysis found 11.3-21.5% of girls and 4.1-19.3% of boys reported CSA, providing further support for CSA as an international problem (Stoltenborgh, van IJzendoorn, Euser, & Bakermans-Kranenburg, 2011). While there may be considerable variability in estimates of CSA, it is clear that CSA is not uncommon; therefore, let us consider its impact.

Consequences of Sexual Abuse

There is general agreement on the negative, far-reaching consequences of CSA. CSA has been linked to a variety of mental health outcomes including increased rates of anxiety (Swanston et al., 2003), depression (Felitti, 1991; Swanston et al., 2003; Trickett et al., 2001), posttraumatic stress disorder (Wolfe et al., 1989), eating disorders (Kendler et al., 2000; Swanston et al., 2003), and substance abuse disorders (Kendler et al., 2000; Swanston et al., 2003). Meta-analysis and literature reviews have established that CSA history is correlated with a wide range of adverse health consequences as measured by documented symptoms and self-appraisal of physical health (Chartier, Walker, & Naimark, 2007; Golding, Cooper, & George, 1997; Irish et al., 2009; Leserman, 2005; Springer, Sheridan, Kuo, & Carnes, 2003; Maniglio, 2009). For example, CSA is associated with specific health problems as obesity (Chartier et al., 2007; Felitti, 1991), cardiac risk (Dong et al., 2004; Goodwin & Stein, 2004), pain (Bonomi, Cannon, Anderson, Rivara, & Thompson, 2008), and sleep disturbance (Chambers & Belicki, 1998; Cuddy & Belicki, 1992). The present research focuses on the connection between CSA and sleep disturbance.

Childhood Sexual Abuse and Sleep Disturbance

Sleep is an integral part of daily life and, as such, has strong connections to physical and mental well-being. Unfortunately, sleep complaints are common. In the general population, insomnia prevalence rates are estimated at 10% to 20%, with half of those experiencing chronic insomnia (Buysse, 2013). I return to a more detailed discussion of insomnia later, but for now note that insomnia is not distinguished by short sleep (e.g., four hours nightly), but rather by primary symptoms (i.e., difficulty initiating and/or maintaining sleep) (Ohayon, 2002). Insomnia has been connected to a range of problems, including increased risks for hypertension (Vgontzas, Liao, Bixler, Chrousos, &Vela-Bueno, 2009), acute myocardial infarctions (Laugsand, Vatten, Platou, & Janszky, 2011), alcohol abuse (Weissman, Greenwald, Nino-Murcia, & Dement, 1997), panic disorder (Weissman et al., 1997), and depression (for review see, Baglioni et al., 2011; Weissman et al., 1997).

Similarly, subjective complaints of insufficient sleep have been connected to poorer emotional wellbeing and health outcomes, including body mass index (Wheaton et al., 2011), obesity (Shankar, Syamala, & Kalidindi, 2010), diabetes mellitus (Shankar et al., 2010), coronary heart disease and stroke risk (Shankar et al., 2010), and pain (Strine & Chapman, 2005). Even simply short sleep duration has been connected to increased weight gain (for review, see: Patel & Hu, 2008), compromised optimism (Haack & Mullington, 2005), hypertension (Gangwisch, 2006), coronary heart disease and stroke risk (Cappuccio, Cooper, D'Elia, Strazzullo, & Miller, 2011), generalized body pain, back pain, and stomach pain (Haack & Mullington, 2005), rapid decline in renal function (McMullan, Curhan, & Forman, 2016), and all-cause mortality (for review, see: Gallicchio & Kalesan, 2009).

While insomnia, subjective ratings of insufficient sleep, and short sleep duration may have similar outcomes, research by Vgontzas et al. (2009) has found that insomnia with short sleep duration is associated with greater risk for hypertension than either insomnia or short sleep duration alone. Thus, even variety in insomnia-like experiences has differential outcomes, highlighting the importance of studying a range of symptoms and disorders.

As research regarding sleep disturbance in adult survivors of CSA is limited, I will first briefly outline the relations between sleep and CSA in child and adolescent survivors. Few studies have examined sleep patterns in children who have experienced CSA despite sleep problems being the most cited life disturbance in children supervised by social workers following occurrence of CSA (Calam, Horne, Glasgow, & Cox, 1998). One study (Goldston, Turnquist, & Knutson, 1989) examined the chief complaints of sexually abused girls utilizing psychiatric services and found that sexually abused children reported more sleep disturbance than their non-abused counterparts. These findings are consistent with other studies that indicate children who have experienced CSA report greater sleep problems than those who have not been sexually abused (Dubowitz, Black, Harrington, & Verschoore, 1993; Harrison, Hoffman, & Edwall, 1989; Rimsza, Berg, & Locke, 1988; Usta & Farver, 2010). Likewise, poorer sleep efficiency, greater nocturnal activity, and longer sleep latencies have also been demonstrated via actigraphy (i.e., portable monitoring that uses lack of movement as an analogue for sleep) (Glod, Teicher, Hartman, & Harakal, 1997).

A number of studies have also shown that when compared to those without abuse histories, adolescents with sexual abuse histories experience more sleep disturbance (Choquet, Darves-Bornoz, Ledoux, Manfredi, & Hassler, 1997; Goldston et al., 1989; Harrison et al., 1989; Noll et al., 2006; Usta & Farver, 2010), strengthening the link between CSA and subsequent

sleep disruption. Given that significant relations exist between CSA and poor sleep during childhood and adolescence, an important question is how long-standing are these effects?

As noted in the review by Steine et al. (2012), there is considerable evidence that adults with a history of CSA report poorer sleep than those reporting no abuse. Compared to their non-abused peers, adults who experienced CSA are more likely to fear sleep (Agargun et al., 2003), have difficulty falling or staying asleep (Chapman et al., 2011), report "sleep disturbance" (Briere, Evans, Runtz, & Wall, 1988), have trouble sleeping (Agargun et al., 2003; Baiden, Fallon, den Dunnen, & Boateng, 2015), have restless sleep (Briere & Runtz, 1987), have shorter sleep duration (Cuddy & Belicki, 1992), and feel daytime tiredness (Chapman et al., 2011). Other studies have found more frequent self-reports of sleep paralysis (Abrams, Mulligan, Carleton, & Asmundson, 2008; McNally & Clancy, 2005), night terrors (Cuddy & Belicki, 1992), nightmares (Cuddy & Belicki, 1992; Dent-Brown, 1993), greater dream anxiety (Agargun et al., 2003), and more time spent awake after nightmares (Cuddy & Belicki, 1992).

Problematically, as Steine et al. (2012) point out, many studies describe effects on CSA victims without any comparison to other groups, (such as non-abused samples), impeding our understanding of whether those who experienced sexual abuse have significantly greater negative symptomology. Similarly, too few studies have included comparisons to other abused samples (e.g., physically abused or emotionally abused), so it is unclear whether findings from studies of sexual abuse are unique to sexual abuse or due more generally to trauma. Thus, it is essential that studies of childhood sexual abuse draw comparison to other groups. Unfortunately, some studies of childhood abuse that did collect information about abuse/trauma subtypes collapsed across groups such that sexual abuse was combined with other forms of abuse/trauma

(e.g., Bader, Schäfer, Nissen, & Schenkel, 2013; Chambers & Belicki, 1998; Zhabenko, Wojnar, & Brower, 2012), precluding comparison between abuse/trauma subtypes.

One such study by Chambers and Belicki (1998) examined the relation between sleep disturbance and resilience in adult survivors of childhood trauma and abuse. The authors collected data on six groups: CSA, physical abuse, emotional abuse, neglect, medical trauma, and other trauma; however, because their primary focus was to examine the role of resilience, and because their sample size in each group was small, the groups were collapsed into an abuse/trauma composite group. While the authors reported significant relations between the presence of childhood abuse/trauma and nightmare frequency, waking distress associated with nightmares, sleep apnea, and narcolepsy when compared to those without a history of abuse/trauma, the results cannot speak to differences between the abuse/trauma groups.

A small number of studies have compared adult sleep between those who experienced CSA and those who experienced childhood physical abuse (Agargun et al., 2003; Chapman et al., 2011; Cuddy & Belicki, 1992; Gelaye et al., 2015; McCauley et al., 1997). Gal et al. (2011) found that, while those who had experienced CSA reported higher percentages of sleep disturbances (38.2%) than their non-abused counterparts (28.4%), those who had experienced physical abuse reported even higher percentages of sleep disturbance (55.2%); however, the authors did not test whether 55.2% was significantly higher than 38.2%. Cuddy and Belicki (1992) found that sexually abused and physically abused university students reported more frequent repetitive nightmares and longer sleep latencies after nightmares than their non-abused peers; however, the physical and sexual abuse groups did not significantly differ from each another. Similarly, McCauley et al. (1997), in a study of physical and psychological problems in adult women who had experienced sexual and/or physical abuse in childhood, found no

differences between those who had experienced sexual abuse versus physical abuse on measures of problems with sleeping and nightmares. The authors did, however, find that those who had experienced physical and sexual abuse during childhood reported a significantly greater number of physical symptoms in adulthood.

Recent research by Gelaye et al. (2015) has examined stress-related sleep disturbance and poor sleep quality among pregnant women who experienced no abuse, sexual abuse, physical abuse, or physical and sexual abuse during childhood. The authors found that, when compared to no abuse, only those who experienced physical and sexual abuses during childhood were found to have significantly increased odds of stress-related sleep disturbance; experience of physical abuse only and experience of sexual abuse only failed to reach significance. Additionally, when compared to those without abuse histories, physically abused (but not sexually abused) persons were more likely to report poor sleep quality. Those who experienced sexual and physical abuse were also significantly more likely than non-abused peers to report poor sleep quality. While this study did not find CSA alone to have a specific relation to sleep disturbance, it did find that any childhood abuse (i.e., sexual or physical abuse collapsed into one group) when compared to no abuse was associated with greater stress-related sleep disturbance and poor sleep quality. While this study was novel in its assessment of the relation between childhood abuses and sleep disturbance during pregnancy, it is possible that findings from obstetric samples may not generalize to non-obstetric populations; as such, further research is needed to replicate this finding. Importantly, this study lends support to the idea that different adverse childhood experiences have differential impacts on adult sleep.

Using a university sample, Agargun et al. (2003), examining the relation between nightmares and dissociation (i.e., a defense mechanism for traumatic experience), compared

adults who experienced CSA not only to those who were physically abused, but also to those who experienced no abuse, maternal loss, and maternal separation. The authors found that CSA and physical abuse differed from no abuse on a number of variables, including nightmare frequency, difficulty in falling asleep, fear of sleeping, and trouble sleeping, but did not significantly differ from each other. However, the generalizability of these results is unclear because group sizes were small, with only 15 participants reporting sexual abuse and 35 reporting physical abuse; additionally, it is unclear if these groups were distinct from each other (i.e., some people may have experienced both sexual and physical abuse). In the same vein, Chapman et al. (2011) found that 3,586 adults who experienced CSA (27%) did not differ in tiredness after sleeping (i.e., daytime sleepiness) from 4,912 adults who experienced childhood physical abuse (27.9%). The authors also examined other adverse childhood experiences, including emotional abuse, witnessed domestic violence, household substance abuse, household mental illness, parental separation/divorce, and household member imprisonment. Akin to Agargun et al. (2003), the groups in this study were not distinct from each other and over a third of participants reported two or more adverse childhood events. In sum, studies comparing those who experienced CSA to those who experienced childhood physical abuse have found similar impact on general sleep disturbance between the two forms of abuse; importantly, however, the studies and the measures used are few. The present research contended that, with improved methodology, distinct sequelae may emerge such that the impact of CSA on later sleep, when compared to that of physical abuse, cannot be considered just a generic effect of trauma. To test this hypothesis, the present study compared a sexually abused sample with non-abused and physically abused samples on sleep-related measures that assess a range of specific disorders.

Childhood Sexual Abuse and Specific Sleep Disorders

The present study examined a variety of sleep disorders, as one shortcoming of prior research is that most studies have focused on general sleep disturbance and very few studies, have done a comprehensive survey of varied sleep disorders. According to the third edition of the International Classification of Sleep Disorders (ICSD-3; American Academy of Sleep Medicine), there are 60 sleep disorders categorized into 7 major classes: insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, parasomnias, sleep-related movement disorders, and other disorders. Previous studies examining sleep disorders in relation to a history of childhood sexual abuse have investigated insomnia (Barker-Collo, 1999; Briere & Runtz, 1987; Chambers & Belicki, 1998; Dent-Brown, 1993), nightmares (Cuddy & Belicki, 1992; Chambers & Belicki, 1998; Dent-Brown, 1993; Krakow, Tandberg, Barey, & Scriggins, 1995), night terrors (Chambers & Belicki, 1998; Cuddy & Belicki, 1992), as well as sleep apnea, periodic leg movements, and narcolepsy (Chambers & Belicki, 1998).

Let us first consider insomnia, arguably the most prevalent sleep disorder class (Buysse, 2013; Ohayon, 2002). The ICSD-3 recognizes chronic and short-term insomnia as the two subclasses of insomnia. Common symptoms of insomnia include difficulty initiating or maintaining sleep, disrupted sleep, and early morning awakenings (Ohayon, 2002). In research and in practice, questions involving sleep onset latency and difficulty falling asleep may speak to the onset facet of insomnia, whereas questions involving frequent awakenings, early morning awakenings, and inability to resume sleep after awakenings address the sleep maintenance facet of insomnia.

Chapman et al. (2011) found that those who experienced CSA were more likely than non-abused peers to report trouble falling or staying asleep. Cuddy and Belicki (1992) found that

CSA survivors in a university sample reported longer sleep latencies when resuming sleep after nightmares. In contrast, when Briere and Runtz (1987) compared sexually abused to non-abused persons, they found no significant differences for insomnia. Dent-Brown (1993) also found no significant differences between these groups; however, non-abused and abused groups only had 18 participants each, so the sample size was small. Given mixed results as to whether insomnia negatively impacts CSA survivors, the present study examines the relation. Should these findings demonstrate a significant association between insomnia and CSA, they will underscore the importance of measuring specific sleep disorders not just generic sleep quality.

Other forms of sleep disturbance that have been studied include parasomnias, which are a group of sleep disorders characterized as undesirable manifestations of central nervous system activation (ICSD-3). These disorders, as described in the ICSD-3, include, though are not limited to, disorders of arousal (e.g., sleepwalking, sleep terrors, confusional arousals), sleep-wake transition (e.g., sleep talking, sleep starts, rhythmic movement disorder), and Rapid Eye Movement (REM) sleep (e.g., nightmares, sleep paralysis, REM sleep behaviour disorder), as well as other, less easily classifiable disorders (e.g., sleep bruxism, primary snoring). Krakow et al. (1995), in a study of women visiting a rape crisis centre, found that women who were raped reported significantly more nightmares than those who had experienced non-rape sexual abuse. However, comparison was not made to those who did not experience abuse/trauma or experienced other forms of non-sexual abuse/trauma.

Research has shown that many who have experienced various forms of trauma (e.g., wartime, motor vehicle accidents, assault) exhibit anxiety dreams or nightmares with disturbing content (Esposito, Benitez, Barza, & Mellman, 1999). Many studies are in agreement that the content of these nightmares exactly replicate the traumatic experience (Schreuder, van Egmond,

Kleijn, & Visser, 1998; van der Kolk, Blitz, Burr, Sherry, & Hartmann, 1984). Regarding sexual abuse in particular, a number of studies have also shown that those having experienced sexual abuse report having more nightmares than non-abused persons (Cuddy & Belicki, 1992; DeDonato, Belicki, & Cuddy, 1996; Dent-Brown, 1993), although in contrast to trauma in adulthood, Arvanitakis, Jodoin, Lester, Lussier, and Robertson (as cited in David & Mellman, 1997, p. 210), Cuddy (1990), and DeDonato, Belicki, & Cuddy (1996) have reported that the nightmare content of sexually abuse persons does not typically replicate the abusive event.

Chambers and Belicki (1998), using a university sample that included men and women, found that participants in a composite trauma group (i.e., sexual abuse, physical abuse, emotional abuse, neglect, medical trauma, and other trauma) reported greater nightmare frequency than those who experienced no abuse/trauma. More specific to sexual abuse, Cuddy and Belicki (1992), in a study of undergraduate women, found that while the sexual abuse and physical abuse groups were significantly different from the no abuse group regarding frequency in the prior year of *repetitive* nightmares and of posttraumatic nightmares (defined as nightmares that replayed a traumatic event), only the sexual abuse group was significantly different from the no abuse regarding general nightmare frequency as well as night terror frequency in the prior year. However, when drawing comparisons to other abused samples, Agargun et al. (2003) found that while CSA survivors were not found to have more frequent nightmares than those who experienced physical abuse or maternal separation, they reported experiencing more frequent nightmares than those who experienced maternal loss, providing support for differential trauma outcomes.

Akin to nightmares are sleep terrors (also called night terrors), a parasomnia also causing nighttime distress (i.e., intense screaming and autonomic nervous system activation), and sleep

disruption (Schenck & Mahowald, 2000). While children tend to be amnesic of these events, adults who experience night terrors often report dreamlike mentation or threatening imagery that may require immediate escape (Schenck, Milner, Hurwitz, Bundlie, & Mahowald, 1989). Nightmares and sleep terrors may, at face value, seem similar; however, according to the ICSD-3, they are different in a number of ways. Importantly, sleep terrors occur in the first third of the sleep period generally in non-REM (NREM) slow-wave (i.e., deep) sleep, whereas nightmares arise from REM sleep later in the sleep period. This distinction is important as it could mean that those experiencing nightmares may have greater difficulty resuming sleep than those exhibiting night terrors, as they could be closer to their natural wake time and thus have less propensity for sleep; however, because nightmares are less likely to inspire tachycardia (i.e., a spike in heart rate) than sleep terrors, this may make equalize the impact of these parasomnias on resuming sleep after an early awakening (ICSD-3). The ICSD-3 adds that sleepwalking may accompany sleep terrors; this is distinct from nightmares as they occur during REM sleep, which is characterized by muscle paralysis.

These central differences provide a strong rationale for research to separately examine nightmares and sleep terrors; however, Cuddy and Belicki (1992) noted that research on abuse had largely not drawn distinctions between these. In a study of undergraduate women, the authors found reports of night terrors to be significantly more frequent in those who experienced CSA than those who experienced physical abuse or no abuse. In the more than 20 years since the publication of that research, sleep terrors have been largely neglected in research on childhood abuse. One exception is a study by Agargun et al. (2002) who explored the relations between select NREM based disorders (i.e., sleep terrors, sleep-related eating, sleepwalking, and sleep-related dissociative hallucinations) and violent behaviours during sleep. The authors also asked

participants about adverse childhood experiences (i.e., CSA, physical abuse, paternal loss, and paternal separation), as previous research by Schenck and Mahowald (2000) noted that elaborate and violent behaviours during sleep may reflect previous abuse, and that sexualized behaviours during sleep may specifically reflect previous sexual abuse. Agargun et al. (2002) found that more participants with violent behaviours during sleep reported experience of childhood physical abuse than those without; CSA, paternal loss, and paternal separation were not significantly related to violent behaviours during sleep. The authors also noted that participants exhibiting violent behaviours during sleep were significantly more likely to report experiencing sleep terrors, sleep-related eating, and sleep-related dissociative hallucinations as well as marginally significantly more likely to report sleepwalking. The present research measured nightmares and sleep terrors.

In addition to research on nightmares and sleep terrors, limited research has examined sleep paralysis, a parasomnia in which awakening from REM sleep occurs without losing its characteristic muscle atonia (i.e., muscle paralysis) and is often accompanied by frightening hypnagogic hallucinations and anxiety centered on the inability to move or talk (ICSD-3). McNally and Clancy (2005) reported that adults who experienced CSA were more likely to report sleep paralysis than those who were not abused. In 2008, Abrams et al. echoed this finding: sexually abused persons not only reported more frequent episodes of sleep paralysis, but also reacted with more anger, fear, pain, and sadness to episodes of sleep paralysis than those without abuse histories.

As few studies have examined the relation between adult survivors of CSA and parasomnias; therefore, I now look briefly to studies on child and youth (i.e., adolescent-young adult) survivors of CSA to better understand this connection. Cecil, Viding, McCrory, and

Gregory (2015) examined the relation between childhood abuse/trauma (i.e., sexual, physical, and emotional abuses as well as emotional and physical neglects) and a global measure of disruptive nocturnal behaviours (e.g., hot flashes, kicking and punching during sleep as well as nightmares and sleep terrors) as measured by the Pittsburgh Sleep Quality Index Addendum for PTSD (PSQI-A) in a community-based study of at-risk youth between the ages of 16-24. Correlational analysis demonstrated that all forms of abuse/trauma were significantly correlated to disruptive nocturnal behaviours, while multivariate regression revealed that only sexual abuse and emotional abuse contributed unique variance. Additionally, parasomnias have been documented to be more common prior to hospital admission, but not in hospital, in samples of children who experienced CSA when compared to non-abused and physically abused samples (Sadeh et al., 1994). Problematically, however, the comparison groups were not distinct as participants who experienced both physical and sexual abuses were included in the CSA group. Additionally, it is unclear how parasomnias were operationally defined in this research; thus, it is necessary for research to more precisely measure parasomnias. The present research used multiple sleep measures to examine parasomnias.

Limitations of Prior Research

The review by Steine et al. (2012) confirms that while disrupted sleep is more common in sexually abused samples than non-abused samples, it is still unclear from current research if these effects are unique to sexual abuse or are generic to trauma. The authors note a number of limitations of the existant research. Firstly, the authors note that many studies have limited generalizability because they used clinic-based sexually abused samples of those seeking treatment and inappropriately small sample sizes. The present research uses a community-based sample that is larger than typically found in prior studies.

Furthermore, the authors note that the literature would benefit from studies drawing comparisons to other groups (e.g., non-abuse, physical abuse, and emotional abuse) as use of comparison groups would improve our understanding of whether particular sleep disturbances are specific to sexual abuse or more generic to trauma. The present study incorporates comparison of sexual and physical abuse groups. Physical abuse is used as it is widely recognized as an undoubtedly traumatic, adverse childhood experience.

Additionally, the authors cite considerable variation in methods of sleep assessment across studies, noting that very few studies have used objective measures of sleep (i.e., actigraphy and polysomnography). In general, most studies to date have used interview (e.g., Loncar et al., 2010) or measures that lack psychometric data. In addition, many only ask participants to respond "yes" or "no" to presence of sleep disorders (e.g., Baiden et al., 2015). As noted below in more detail, the present study represents an improvement in measurement of sleep disorders over most studies.

Steine et al. (2012) also suggest that future research should control for sex differences as well as investigate mediators and moderators of the relation between sexual abuse and sleep problems to better understand the role that co-morbidities and other factors (e.g., social support and abuse characteristics) play. As described below, the present study makes a start in this direction by examining one possible mediator of the relation between CSA and adult sleep dysfunction: recent experience of trauma.

Measurement of Sleep Dysfunction

I first return to the previous mention of the need for a more comprehensive assessment of sleep problems. While some studies have focused on specific sleep problems, there still exists a tendency in CSA research to generically assess sleep disturbance without measuring which

aspect of sleep may be attributing to overall disturbance and poorer well-being. Sleep disturbance is far too broad of a generalization as sleep disorders have unique etiologies and prognoses (ICSD-3). For example, insomnia and sleep paralysis have dissimilar underlying mechanisms and associated features; consequently, research would benefit from the differentiation of sleep disturbance symptomology to better understand if presence of a sleep disorder contributes to sleep disturbance. The present study aims to increase comparability across studies and improves upon previous research through use of several questionnaires that allow measurement of a number of disorders.

Additionally, Steine et al. (2012) note there is a need for studies to use standardized sleep questionnaires, as doing so would increase comparability across studies. Problematically, there is only one standardized measure. A recent review by Mollayeva et al. (2016) declares the Pittsburgh Sleep Quality Index, developed in 1988 and referenced in more than 1500 articles, as "the only standardized clinical instrument that covers a broad range of indicators relevant to sleep quality" (p. 70). However, this measure is primarily designed to measure overall sleep dysfunction, and therefore, it does not definitively assess specific sleep disorders. Moreover, while there is an impressive amount of accumulated data speaking to the reliability, validity, sensitivity, and specificity of the PSQI, there are no established normative data of the quality found with the MMPI, for example. Therefore, not all would agree that even the PSQI is "standardized." However, it is the best in its category and yet too few studies of sexual abuse to date have used this measure. Some exceptions are, in those who experienced adult sexual assault, Casement, Harrington, Miller, and Resick (2012) and Krakow et al. (2000), and, in adult survivors of CSA, Gelaye et al. (2015) and Greenfield et al. (2011).

Steine et al. (2012) comment that methods of sleep measurement vary: while some studies have employed clinician ratings (e.g., Dent-Brown, 1993; Lindberg & Distad, 1985), most studies of adults use self-report questionnaires and many have used questions written for the specific study that lack established reliability or validity. Other studies have used measures or even subscales of trauma questionnaires that include questions about sleep and have been used in prior research and have demonstrated reliability and validity (e.g., Barker-Collo, 1999; Briere et al., 1998; Briere & Runtz, 1987; Duke, Allen, Rozee, & Bommaritto, 2008; Heath, Bean, & Feinauer, 1996), but these studies have not typically measured a broad range of sleep disturbances. The present study improves upon previous research by using several sleep questionnaires with sound psychometric properties.

Mechanisms Underlying the Relation Between CSA and Sleep Disturbance

Steine and colleagues (2012) also outline a need for studies to examine possible mediators and moderators of the relation between CSA and adult sleep disturbance. Such a shift in focus requires researchers to move beyond the existence of trauma outcome ("Are these relations significant?") to how and why do these relations exist?

Some studies have made theoretical proposals about mediation. In a 2015 review, Kajeepeta and colleagues discuss potential mechanisms by which adverse childhood experiences impact sleep disturbance. The authors give an overview of the literature, suggesting that no single proposed biological and social mechanism would completely explain the relation between adverse childhood experiences and poor sleep, but rather that there would be an interplay between these. The authors cited several possible mechanisms, some of which have come from theoretical proposals about mediation. For instance, Sher (2008) made a theoretical argument that disrupted neuro-development and related psychiatric disorder may act as a mediator of the

relation between childhood abuse and adult sleep given that childhood abuse increases the risk for adolescents and adults to develop post-traumatic mood disorder (i.e., comorbid PTSD and major depressive disorder) and related sleep disturbance symptomology. Similarly, Bader et al. (2013), made a theoretical case for increased brain activity during sleep to act as a mediator of the relation between childhood abuse/trauma and sleep disruption (i.e., insomnia). In a study of patients with primary insomnia, the authors found increased high-frequency electroencephalogram activity during NREM sleep to be related to reports of childhood abuse/trauma (i.e., sexual abuse, physical abuse, emotional abuse, physical neglect, and emotional neglect). However, the authors cautioned against causal language and suggested that research implementing prospective methodology would better be suited to explaining such a link.

In addition, although not specifically examining child abuse, theoretical work has also considered mechanisms that would be relevant to child abuse. In 1999, Arborelius, Owens, Plotsky, and Nemeroff reviewed the role of corticotropin-releasing factor in depression and anxiety disorders. The authors began by suggesting that early-life stress (e.g., childhood abuse) may contribute to the formation of "biological 'wounds'" that create a tendency for subsequent development of mood or anxiety disorders through increased vulnerability to stressors (p. 1). The authors conclude that corticotropin-releasing factor is produced excessively in depression, that this hypersecretion leads to an increase in hypothalamic-pituitary-adrenal axis activity, and that this hyperactivity may mediate a number of depressive symptoms, including sleep disturbance. Vgzontas et al. (2016) also reported that insomniacs demonstrated more hypothalamic-pituitary-adrenal axis activation than controls and that such chronic physiological arousal puts insomniacs at greater risk not only for sleep disturbance but also depression, anxiety disorders, and medical disorders.

There is a paucity of studies that have empirically tested possible mediators. One such study by Ramsawh, Ancoli-Israel, Sullivan, Hitchcock, and Stein (2011) concluded that neuroticism mediates the relation between adverse childhood experiences and PSQI score, though this tells us little about neuroticism as a mediator of CSA alone. Additionally, Cecil et al. (2015) found that trauma-related psychopathology (i.e., anger, anxiety, depression, dissociation, and posttraumatic stress) mediated the relation between form of childhood abuse/trauma and disruptive nocturnal behaviours. Not only was trauma-related psychopathology independently associated with emotional abuse, but it also was found to significantly mediate the relation between emotional abuse and disruptive nocturnal behaviours. The opposite was found for CSA as it was not significantly related to trauma-related psychopathology, and therefore did not mediate the relation between CSA and disruptive nocturnal behaviours.

Even less work has considered possible moderators. This is especially true of biological sex as a possible moderating factor given that prevalence of CSA is higher in women than in men. Senn, Carey, and Vanable (2008) point out that most studies of CSA have included women but not men due to the ease of finding appropriate sample sizes. However, some authors have examined the role of biological sex as a possible moderator in studies of CSA. For instance, Ramsawh et al. (2011) found that biological sex significantly moderated the relation between adverse childhood event total score and poor sleep quality, as measured by PSQI scores, such that stronger associations were found in men than women. In a different vein, Cecil et al. (2015) examined executive function as a possible moderating variable of the relations between two abuse forms (i.e., sexual abuse and emotion abuse) and disruptive nocturnal behaviours. The authors found that executive function was a significant moderator for CSA, but not for emotional abuse. The present study focuses on the possibility of mediation, specifically by recent (i.e., post-

childhood) trauma as a variable that may account for the elevated incidence of adult sleep disturbance in CSA survivors.

Recent trauma as a mediator. In a clinical study of women seeking crisis counselling, Briere and Runtz (1987) found that those who were sexually abused prior to the age of 15 had significantly higher rates of physical abuse (i.e., domestic violence) but not rape as adults than peers who were not sexually abused. However, the authors only looked at rape; perhaps if they had expanded measurement to include other forms of sexual assault, results would have been in line with other studies, which have found that survivors of CSA, when compared to non-sexually abused peers, are at an increased risk for subsequent sexual assault across the lifespan (e.g., Russell, 1986, as cited by Chu, 1992, p, 259). For example, Fergusson, Horwood, and Lynskey (1997), in an 18-year prospective, longitudinal study starting at birth, asked female participants from ages 16 to 18 to report, among other things, rape/attempted rape and sexual assault. At age 18, participants were again asked to retrospectively report any received unwanted sexual attention. The authors found that those who experienced CSA with contact (i.e., that did or did not involve attempted or completed intercourse) were significantly more likely than those who did not experience CSA to experience rape/attempted rape or sexual assault after the age of 16. And we continue to see this trend in adulthood: in a 15-year prospective, longitudinal study, Barnes, Noll, Putnam, and Trickett (2009) found that women who experienced substantiated CSA were nearly twice as likely to experience adult sexual assault or physical abuse than those who did not experience CSA. Additionally, the authors found that those who experienced CSA were more likely than peers not sexually abused as children to experience physical injury during subsequent adult sexual assault. This suggests that adult sexual assault subsequent to CSA may have unique sequelae related to health and wellbeing. Relatedly, research has found sleep to be

related to victimization. Noll et al. (2006) found sleep disruption, to be a significant predictor of revictimization when entered in age-controlled regression along with abuse status, depression, and PTSD symptomology. In sum, it is reasonable to expect that those who have experienced CSA may experience subsequent sexual assault in adulthood and that this recent experience may further disturb sleep given that, as previously discussed, trauma can affect sleep negatively. Therefore, perhaps the relation between CSA and current sleep disruption is at least partially due to the elevated incidence of recent trauma.

In a 2015 review, Kajeepeta et al. suggested that the association between adverse childhood experiences and later revictimization may account for adult sleep disturbance. Cecil et al. (2015), in a study of youth aged 16-24, made a case for subsequent trauma to contribute to sleep disturbance in those who experienced childhood abuse/trauma. The authors instead examined trauma-related psychopathology as a mediator of the relation between childhood maltreatment and disruptive nocturnal behaviours and included recent trauma (i.e., community violence exposure in the prior year) as a covariate. So while recent trauma was not investigated as a mediator, recent trauma was positively correlated to disruptive nocturnal behaviours. However, in a study of Peruvian pregnant women, Gelaye et al. (2015) explored two possible mediators, intimate partner violence and antepartum depression, of the relations between childhood abuse (i.e., physical abuse and/or sexual abuse) and two sleep outcomes, stress-related sleep disturbance and poor sleep quality. The authors defined intimate partner violence as physical or sexual coercive behaviours in the 12 months prior the study. Both antepartum depression and intimate partner violence were significant mediators with antepartum depression accounting for more of the indirect effect than intimate partner violence in both cases. However, the authors only measured intimate partner violence. As Barnes et al. (2009) found that those

who experienced CSA were more likely than those not sexually abused as children to experience adult sexual assault at the hands of non-peers, what is needed is a more general measure of recent trauma. Had the authors included a more general measure of recent trauma, it is possible that antepartum depression would have shared variance with general trauma. The present study seeks to extend our understanding of recent trauma by considering recent trauma as a variable that may account for the elevated incidence of adult sleep disturbance in a general sample of CSA survivors.

Summary and Hypotheses

The aim of the present research is to advance our understanding of why those with histories of CSA are more likely to have disrupted sleep. The present study is an improvement to the current literature in terms of measurement and sample. Specifically, this study used not only more thorough measurement by use of several sleep questionnaires, but also better quality of measurement by using measures with sound psychometric properties. Additionally, this study used a non-clinical, community sample larger than in many prior studies and included comparisons to other forms of abuse/trauma.

In this research, I tested two predictions. First, it is possible that sleep disturbances are due to a generic effect of trauma. To that end, I compared those with a history of CSA to those with a history of childhood physical abuse, to see if they differed. Further, I measured a wide range of specific sleep symptoms and disorders, not just general sleep dysfunction, to examine if specific patterns of sleep disturbance emerge as being more characteristic of sexual abuse than of physical abuse. Second, because those with histories of CSA are more likely to experience subsequent adult abuse/trauma, it is also possible that adult sleep disturbance is due to the effect of more temporally proximal traumatic experiences.

The following hypotheses were tested:

- That those who had experienced CSA would have poorer overall sleep when compared to their non-abused peers.
- That people with a history of CSA would show different patterns of sleep dysfunction than those with a history of physical abuse.
    - For example, due to possible autonomic arousal in an adaptive response to threats to survival, that those who had experienced childhood physical abuse would report greater disorders of arousal (i.e., sleepwalking, sleep terrors) than those who have been sexually abused.
- That post-childhood trauma would partially mediate the relation between CSA and sleep quality.

Method

Participants

Four-hundred and three participants were recruited from Mechanical Turk (MTurk), a website run by Amazon that allows researchers to survey anonymous, online workers. A total of seven participants were excluded from the study for these reasons: missing a majority of attention checks (n = 3), completing the questionnaire while under 21 years of age (n = 3), and selecting "Prefer Not to Say" 50 times (n = 1). Of the remaining 396 participants, 197 identified as female, 197 as male, 1 as genderqueer, and 1 participant's response to this question was in Russian and was labeled as missing data. Participants' ages ranged from 21 to 71 (M = 34.96, SD = 10.74). The sample was mostly Caucasian (80.1%). Of the remaining, 9.3% identified as African American, 3.3% Asian, 3.0% Hispanic or Latino, 1.5% Caucasian/Hispanic or Latino, 1% Caucasian/Native American, and 1.8% mixed ethnic background. In general, this was an

educated sample: 11.1% had completed a professional degree; 33.1% had completed a university undergraduate degree; 13.1% had completed a college/apprenticeship diploma and/or a technical diploma; 31.8% had completed some of college, university, or an apprenticeship program; 10.1% had completed high school; and .8% had not completed high school. Regarding employment, 64.6% were full-time employees, 13.1% part-time, 10.4% unemployed, and 2.5% retired; 7.8% selected other and 1.5% selected "Prefer Not to Say".

All participants received $2.50 USD in remuneration for their participation in this study.

Measures

Copies of all questionnaires can be found in the Appendices. Unless otherwise noted below, scale scores were calculated by taking the mean of items to pro-rate for missing data. Prepared to allow 5% of missing data, I visually inspected data for missingness, which seemed to fall well within acceptable boundaries. Additionally, psychometric analyses from this data will be given in the Results section.

Demographics. Participants were asked to provide information on age, sex, ethnicity, employment status, relationship status, living situation, and number of children (Appendix A).

Abuse/Trauma. Participants were asked to complete two measures of childhood trauma and abuse and one measure of recent (i.e., adult) trauma or abuse, and if they indicated that CSA occurred on at least one measure of childhood abuse/trauma, a further inventory of abusive sexual experiences.

Childhood Experiences Questionnaire (CEQ). Childhood trauma was assessed by the CEQ (Belicki et al., 1994; Chambers & Belicki, 1998), a 6-item self-report instrument intended to measure six forms of childhood trauma: sexual abuse, physical abuse, emotional abuse, emotional or physical neglect, medical trauma, and non-abusive trauma (Appendix B).

Participants were asked to indicate if abuse occurred by selecting, for each item, "No", "I don't know, but I doubt it", "I don't know but I have a suspicion that maybe yes", and "Yes". Chambers and Belicki only counted responses of "Yes" as indicating that a trauma or abuse had occurred in order to reduce over-reporting of childhood trauma. In addition, they instructed participants to only report experiences that occurred before the age of 14; however, as the current study uses a broader definition of childhood (i.e., it may extend beyond age 14), this instruction was removed. Although internal consistency is not relevant to this measure, other psychometric data (e.g., test-retest reliability) was not reported for this measure.

Childhood Traumatic Events Scale (CTES). Childhood trauma was measured by the CTES (Pennebaker & Susman, 1988), which examines five childhood traumas: sexual trauma, violence, parental upheaval (e.g., divorce and separation), death of a family member or a close friend, illness or injury, as well as other trauma (Appendix C). Participants were asked to indicate whether each of these events occurred on a simple yes/no scale. When participants responded "Yes", they were then asked to describe their age(s) and, as best as possible, when these events occurred (i.e., "for example, 3 times between the ages of 7 and 9"). From the information provided by participants, variables were created that reflected the earliest age at which each type of trauma occurred. Participants were also asked to rate the intensity and disclosure of (i.e., confiding in others about) traumas on 7-point scales, which ranged from 1 = "Not at All Traumatic" to 7 = "Extremely Traumatic" for intensity, and from 1 = "Not at All" to 7 = confided "A Great Deal" for disclosure. Although internal consistency is not relevant to this measure, other psychometric data (e.g., test-retest reliability) was not reported for this measure.

Recent Traumatic Events Scale (RTES). Abuse/trauma occurring after childhood (i.e., in contrast to <u>during</u> childhood with the CTES) was examined by the RTES (Pennebaker &

Susman, 1988). Akin to the CTES, the RTES (Appendix D) asked participants about a range of experiences, including sexual trauma, violence, death of a family member or a close friend, illness or injury, other trauma, and work change. However, where the CTES measured parental upheaval, the RTES asked about partner upheaval (e.g., divorce and separation). The RTES, like the CTES, asked participants about age and disclosure of abuse/trauma. When participants responded that an event had occurred, they were asked to describe their age(s) and, as best as possible, when these events occurred (i.e., "for example, 3 times between the ages of 7 and 9"). From the information provided by participants, variables were created that reflected the earliest age at which each type of trauma occurred. Participants were also asked to rate the intensity and disclosure of (i.e., confiding in others about) traumas on 7-point scales, which ranged from 1 = "Not at All Traumatic" to 7 = "Extremely Traumatic" for intensity, and from 1 = "Not at All" to 7 = confided "A Great Deal" for disclosure. Although internal consistency is not relevant to this measure, other psychometric data (e.g., test-retest reliability) was not reported for this measure.

Unwanted Childhood Sexual Experiences Questionnaire (UCSEQ). Participants who indicated "Yes" on either the CTES or the CEQ item concerning sexual abuse were directed to the Unwanted Childhood Sexual Experiences Questionnaire (Stevenson & Gajarsky, 1992). Here participants were asked to select which, if any, of 13 unwanted childhood sexual experiences that range from minimal to maximal contact, were experienced (Appendix E). In Stevenson and Gajarsky's study, participants were instructed to consider only experiences that occurred before the age of 16 at the hands of someone at least 5 years older; however, as the present study uses broader definitions of not only childhood (i.e., it may extend beyond age 16), but also sexual abuse (i.e., it may include experiences with peers), these instructions were removed. Correspondingly, the term "adult" was replaced with "person". Although internal consistency is

not relevant to this measure, other psychometric data (e.g., test-retest reliability) was not reported for this measure.

Sleep. For the purposes of this study, participants were asked to complete five sleep measures. Within these sleep questionnaires, I added three attention checks (see below).

Attention Checks. To encourage attentiveness during completion of the study, three attention checking questions were spaced throughout the sleep measures. Attention checks were intentionally not used within the abuse/trauma questionnaires, as I wanted to ensure no participant would feel uncomfortable by an out-of-place question during questions of a sensitive nature. Participants were given easy to solve questions; however, even when answering incorrectly, participants were able to continue on with the study and collect remuneration for their participation. I later reviewed responses to these items to ensure that participant responses used in analyses are reliable. The first attention check (i.e., “I am paying close attention to these questions and am not a "bot" -- select "Three or more times a week".”) was imbedded within the PSQI. Response options (i.e., “Not during the past month”, “Less than once a week”, “Once or twice a week”, “Three or more times a week”, and “Prefer Not to Say”) matched those of the surrounding questions. The second attention check (i.e., “Triangles have four sides. (hint: select "Not at all").”) was placed within the SLEEP-50 Questionnaire. Response options (i.e., “Not at all”, “A little”, “Rather much”, “Very much”, “Prefer Not to Say”) matched those of the preceding question. The third attention check, (i.e., “To show you are not a bot, select "Definitely".) was embedded within the Nightmare Distress Questionnaire. Response options (i.e., “Not at all”, “Slightly”, “Somewhat”, “Definitely”, “A great deal”, and “Prefer Not to Say”) matched those of the surrounding questions. Due to experimenter error, this question was

embedded within a section of the measure that was skipped for participants who did not report having nightmares (n = 67). The first two attention checks were used for all participants.

Pittsburgh Sleep Quality Index (PSQI). Sleep disturbance was assessed by means of the PSQI (Buysse et al., 1989), a well-validated (for review, see Mollayeva et al., 2016), self-rated instrument that asks respondents to rate sleep quality and general sleep disturbance with respect to the last month. The PSQI contains 19 items in seven subscales: Sleep Latency (2 items), Duration of Sleep (1 item), Sleep Disturbance (9 items), Daytime Dysfunction Due to Sleepiness (2 items), Sleep Efficiency (3 items), Overall Sleep Quality (1 item), and Use of Sleep Medicine (1 item). In order to derive a global score of sleep dysfunction, the authors provide for each subscale a formula to convert scores to a component score ranging from 0 to 3, with higher scores indicating greater sleep dysfunction (e.g., longer Sleep Latency, poorer Sleep Efficiency). The measure itself is given in Appendix F and the instructions for converting each subscale to a component score is given in Appendix G. These seven component scores are summed to form a global score of sleep dysfunction from 0 to 21, with higher scores indicating worse overall sleep quality. An aggregate score greater than 5 [sensitivity 89.6%, specificity 86.5%, (kappa = 0.75, $p < 0.001$)] designates poor sleep quality whereas a score of 5 or less good sleep quality. Buysse et al. (1989) report that the global, composite score is easy to understand and has high overall internal consistency (Cronbach's $\alpha = 0.83$), test-retest reliability ($r = 0.85$, $p < 0.001$), and validity as indicated by significantly different components score profiles between subject groups with different classifications of sleep disorders as well as favourable comparisons of sleep latency estimates with polysomnography. Because the present study is interested in specific sleep disorders (as opposed to more general sleep disturbance), I also analyzed scale scores calculated

taking the mean of the raw scores in addition to the global score. By using the raw scores (instead of the component scores of 0-3), I increased statistical power.

Pittsburgh Sleep Quality Index Addendum for PTSD (PSQI-A). The PSQI-A (Germain et al., 2004) is an addendum to the PSQI that addresses disruptive nocturnal behaviours occurring during sleep in those experiencing PTSD. This is a well-validated, self-rated instrument with seven items that asks respondents to rate seven specific disruptive nocturnal behaviours with respect to the last month (Appendix H). Each item has a possible score ranging from 0 to 3, with higher scores indicating greater event frequency and worse sleep quality. Items are summed to yield a composite score from 0 to 21, with higher scores indicating greater experience of disruptive nocturnal behaviours. To be clear, this global score differs from that of the PSQI, which speaks to general sleep disturbance, in that this measure addresses disruptive nocturnal behaviours associated with PTSD. In addition to use of the composite score, one item on the PSQI-A was used to measure presence of sleep terrors: "During the past month, how often have you had trouble sleeping because you had episodes of terror or screaming during sleep without fully awakening?"

In the initial validation of this scale, Germain et al. (2005) drew from two all-female samples to distinguish those with PTSD (i.e., sexual assault survivors) from those without (i.e., women caregiving for another person as well as women who were not caregivers). In this validation, aggregate score of 4 or greater [sensitivity 94%, specificity 82 %] designated poor sleep quality, whereas a score less than 4 expressed good sleep quality (Germain et al., 2004). The authors also report high overall internal consistency (Cronbach's $\alpha = 0.85$) and suggest that the instrument's good sensitivity lends credence to its reliability. The single item measuring episodes of terror had an item-total correlation of $r = .55$. As the initial validation had only

female participants, Insana, Hall, Buysse, and Germain (2013) validated this measure in men (i.e., U.S. military veterans). In this validation, an aggregate score of 4 or greater [sensitivity 71%, specificity 82 %] designated poor sleep quality. Internal consistency was adequate (Cronbach's $\alpha = 0.72$). An item-total correlation for episodes of terror was not given. Speaking to the use of this measure in men who have experienced CSA, I am confident that the PSQI-A accurately assessed disruptive nocturnal behaviours for all participants, as research has shown that severity of sleep disturbance related to PTSD does not vary by gender (Germain, Buysse, Shear, Fayyad, & Austin, 2004).

SLEEP-50 Questionnaire (SLEEP-50). Presence of disordered sleep was screened by the SLEEP-50 (Spoormaker et al., 2005), a 50-item measure intended to capture the most salient sleep complaints and disorders as described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The SLEEP-50 (Appendix I) not only distinguishes between sleep disorders, but also measures their impact on daily functioning. Of its nine subscales, one centres on Factors Influencing Sleep (7 items), one on waking impairment (i.e., the Impact of Sleep Complaints on Daily Functioning, 7 items), and seven on the presence of sleep disorders: Sleep Apnea (8 items), Insomnia (8 items), Narcolepsy (5 items), Restless Legs/PLMD (four items), Circadian Rhythm Sleep Disorder (3 items), Sleepwalking (3 items), Nightmares (5 items). Each item is rated from 1 ("not at all") to 4 ("very much"). It is also possible to calculate a global score. For this overall score, the authors report high overall internal consistency (Cronbach's $\alpha = .86$), good test-retest reliability over three weeks (Pearson's $r = 0.78$, $p < 0.001$), and acceptable construct validity as assessed by principal component analysis; however, the present study used only the subscales. In addition to using the subscale scores, I used a single item (i.e., "I have frightening dreams") from the Nightmares subscale to estimate nightmare frequency.

Nightmare Distress Questionnaire (NDQ). Participants were first asked "Have you ever had a nightmare? By nightmares I mean very distressing dreams that are clearly recalled upon awakening." Those that answered "Yes" (i.e., as opposed to "No" or "Prefer Not to Say") were then asked to complete the NDQ, a 13-item self-report measure on 5-point scales (Belicki, 1992b) for the purposes of other research. The present study used participants' answers to one additional item from this questionnaire to estimate nightmare frequency: "How many nightmares have you had in the prior year? By nightmares we mean very distressing dreams that are clearly recalled upon awakening." Prior research has deemed this to be a reliable and valid measure of nightmare frequency (Wood & Bootzin, 1990).

Waterloo Unusual Sleep Experiences Questionnaire-VIIIa (WUSEQ). Experience of sleep paralysis, a parasomnia of interest, was measured by two items (Appendix J) from the WUSEQ (Cheyne, 2002), a 42-item questionnaire designed to evaluate the frequency, intensity, and hallucinatory experiences associated with sleep paralysis. As the last is not a focus of the present study, participants were only asked to complete two items to assess the frequency and intensity of sleep paralysis. Frequency is rated on a 7-point scale, ranging from 1 = "never" to 7 "several times a week". Those who reported having experienced sleep paralysis at least once were asked to rate the intensity of sleep paralysis experience(s) on a 7-point scale, ranging from 1 = "vague and suggestive, more like a hint of something" to 7 = "a very clear and distinct impression as clear as any everyday experience". Internal consistency was not relevant to this measure, as many participants only completed one of two items administered. Additionally, other psychometric data (e.g., test-retest reliability) was not reported for this measure.

Measures for the purposes of other research. Participants also completed two measures for the purposes of other research.

Sleep Hygiene Index (SHI). Information on healthy sleep practices was evaluated by the SHI (Mastin et al., 2006), a 13-item self-report measure of health behaviour rated on 5-point scales.

Health Behaviour Index (HBI). Health behaviours were assessed by a modified version of a questionnaire of health-related behaviours developed by Conner, McEachan, Taylor, O'Hara, and Lawton (2015). The current version had 16 items instead of the original 20 items.

Procedure

Participants began the survey in MTurk by clicking a hyperlink to the survey, which was administered via the online survey tool Qualtrics. Prior to completion of questionnaires, potential participants were first given a letter of invitation and informed consent (Appendix K) with information about the present study and which explicitly informed them that, among other things, the questionnaires would ask about past abuse histories. Throughout the study, participants were given the opportunity to select "Prefer Not to Say" on items to which they felt uncomfortable responding. After consent was given, participants completed demographic questions and then two blocks of questionnaires. The first contained two counterbalanced abuse/trauma measures, followed by the measure of recent trauma. The second contained randomized measures of sleep and of health behaviour. Participants were then asked to complete a feedback questionnaire (Appendix L). Upon completion, participants were given a feedback letter (Appendix M).

Results

Participant Characteristics

Two participants were not included in analyses of sex differences, the person who indicated gender identity (genderqueer) instead of biological sex and the one who answered the

question in Russian. These two were 24 and 33 years of age. Both participants self-identified as Caucasian. One had completed a university undergraduate degree and the other had completed a professional degree (e.g., Masters, PhD, medical doctor, lawyer). One was employed full-time and the other was unemployed. One self-reported experiencing physical abuse on both questionnaires and the other CSA and physical abuse on both questionnaires.

Frequency of responses by type of abuse/trauma for the total sample as well as separately for women and men are in Table 1 for the CEQ and Table 2 for the CTES. Means, standard deviations, and other descriptive statistics by type of abuse/trauma and sex are in Table 3 for the CTES. Crosstabulations comparing responses is shown in Table 4. As shown in theses tables, 104 participants responded "Yes" that CSA had occurred on the CEQ, while 116 participants responded "Yes" on the CTES, and only 100 responded "Yes" to both.

In addition to "Yes" and "No", the CEQ gave participants two options that reflected uncertainty toward experiences of abuse/trauma. Regarding sexual abuse, 15 participants responded, "I don't know, but I doubt it" and another 28 responded, "I don't know, but I suspect yes". As a sizeable minority of participants expressed uncertainty in experience of abuse/trauma, a crosstabulation of CEQ and CTES responses was conducted for the three variables that were comparable in the two inventories: CSA, physical abuse, and illness/medical trauma (Table 4). The people who indicated on the CEQ that they did not know whether abuse occurred could have selected "Prefer Not to Say" on the CTES, but almost all selected "Yes" or "No". Of these, 10 of 38 participants indicated that sexual abuse occurred, 18 of 51 that physical abuse had occurred, and 10 of 34 that medical trauma had occurred, even when they were uncertain that it had. From these data, it is evident that it is important to give participants the option of selecting

responses that reflect uncertainty in experience of abuse/trauma. Additionally, it is clear that a response of "Yes" on either questionnaire may not adequately reflect experience of abuse/trauma. For this reason, I operationalize sexual abuse and physical abuse as having occurred when participants responded "Yes" on relevant CEQ and CTES items, and as having not occurred when participants said "No" on both.

Sexual abuse experiences are displayed in Table 5; 83 out of these 100 sexually abused participants indicated one or more sexual behaviours on the UCSEQ. Participants generally endorsed experiencing more than one abuse characteristic measured by the UCSEQ: 12.0% endorsed 1 behaviour; 28.9% endorsed 2 behaviours; 41.0% endorsed 3 behaviours; 56.6% endorsed 4 behaviours; and the remaining 43.4% endorsed 5 or more behaviours.

For women and men as well as for the total sample, frequencies of recent trauma are in Table 6 and other descriptive statistics of recent trauma are in Table 7. Recent trauma was computed as a mean of all traumatic events participants were asked about on the RTES (i.e., sexual trauma, violence, death of a family member or a close friend, illness or injury, work change, and other trauma), such that greater numbers reflect more unique event categories experienced.

Table 1

Frequency of CEQ Responses by Type of Abuse/Trauma and Sex

	Responses				
Traumatic Event	No *f* (%)	I don't know, but I doubt it. *f* (%)	I don't know, but I suspect yes. *f* (%)	Yes *f* (%)	Sex Difference $\chi 2$
Sexual Abuse					
Total	241 (62.1)	15 (3.9)	28 (7.2)	104 (26.8)	
Women	94 (48.5)	8 (4.1)	17 (8.8)	75 (38.7)	
Men	147 (75.8)	7 (3.6)	11 (5.7)	29 (14.9)	33.35***
Physical Abuse					
Total	197 (50.3)	23 (5.9)	29 (7.4)	143 (36.5)	
Women	106 (54.1)	10 (5.1)	14 (7.1)	66 (33.7)	
Men	91 (46.4)	13 (6.6)	15 (7.7)	77 (39.3)	2.41
Emotional Abuse					
Total	133 (33.9)	24 (6.1)	29 (7.4)	206 (52.6)	
Women	65 (33.0)	8 (4.1)	12 (6.1)	112 (56.9)	
Men	68 (34.9)	16 (8.2)	17 (8.7)	94 (48.2)	5.16
Neglect					
Total	204 (51.8)	19 (4.8)	38 (9.6)	133 (33.8)	
Women	101 (51.3)	9 (4.6)	21 (10.7)	66 (33.5)	
Men	103 (52.3)	10 (5.1)	17 (8.6)	67 (34.0)	0.50
Medical Trauma					
Total	302 (76.8)	21 (5.3)	12 (3.1)	58 (14.8)	
Women	156 (79.2)	10 (5.1)	9 (4.6)	22 (11.2)	
Men	146 (74.5)	11 (5.6)	3 (1.5)	36 (18.4)	6.76
Other Trauma					
Total	262 (67.4)	28 (7.2)	23 (5.9)	76 (19.5)	
Women	121 (62.4)	15 (7.7)	16 (8.2)	42 (21.6)	
Men	141 (72.3)	13 (6.7)	7 (3.6)	34 (17.4)	6.03

Note. $N = 396$. CEQ = Childhood Experiences Questionnaire. ***$p < .001$.

Table 2

Frequency of Childhood Trauma (CTES) for Total Sample, and Women vs. Men

Traumatic Event	Number Reporting *f* (%)	χ 2 for Sex Difference
Sexual Trauma		
Total (*N* = 388)	116 (29.9)	
Women (*N* = 193)	83 (43.0)	
Men (*N* = 193)	32 (16.6)	32.22***
Violence		
Total (*N* = 394)	158 (40.1)	
Women (*N* = 195)	67 (34.4)	
Men (*N* = 197)	89 (45.2)	4.79*
Death		
Total (*N* = 392)	215 (54.8)	
Women (*N* = 196)	105 (53.6)	
Men (*N* = 194)	110 (56.7)	0.39
Parental Upheaval		
Total (*N* = 392)	203 (51.8)	
Women (*N* = 197)	111 (56.3)	
Men (*N* = 193)	91 (47.2)	3.30
Illness or Injury		
Total (*N* = 390)	83 (21.3)	
Women (*N* = 196)	38 (19.4)	
Men (*N* = 192)	44 (22.9)	0.73
Other Trauma		
Total (*N* = 379)	101 (26.6)	
Women (*N* = 191)	60 (31.4)	
Men (*N* = 186)	40 (21.5)	4.75*

Note. CTES = Childhood Traumatic Events Scale. Number Reporting reflects the number and percentage of participants in the sample reporting each event. Chi Square given reflects difference between men and women. *p < .05. ***p < .001.

Table 3

Descriptive Statistics of CTES by Type of Abuse/Trauma and Sex

	Earliest Age			Intensity			Disclosure		
Traumatic Event	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference
Sexual Trauma									
Total	1-18	7.74 (3.40)		4-7	6.24 (1.04)		1-7	2.12 (1.81)	
Women	2-16	7.57 (3.41)		4-7	6.34 (1.02)		1-7	1.87 (1.59)	
Men	1-18	8.22 (3.43)	0.92	4-7	6.06 (1.05)	-1.29	1-7	2.75 (2.20)	2.38*
Violence									
Total	1-17	6.58 (3.42)		2-7	6.10 (1.19)		1-7	2.65 (1.81)	
Women	1-17	6.03 (3.44)		3-7	6.19 (1.13)		1-7	2.21 (1.68)	
Men	1-16	6.92 (3.39)	1.6	2-7	6.02 (1.24)	-0.88	1-7	2.93 (1.85)	2.52*
Death									
Total	1-19	8.83 (3.41)		1-7	5.74 (1.28)		1-7	3.65 (2.04)	
Women	1-19	9.15 (3.59)		2-7	5.83 (1.31)		1-7	3.51 (2.04)	
Men	1-18	8.51 (3.21)	-1.37	1-7	5.66 (1.24)	-0.96	1-7	3.78 (2.03)	0.98
Parental Upheaval									
Total	1-16	7.13 (3.75)		1-7	5.20 (1.66)		1-7	2.67 (1.72)	
Women	1-14	7.05 (3.94)		1-7	5.21 (1.60)		1-7	2.32 (1.53)	
Men	1-16	7.30 (3.48)	0.47	1-7	5.16 (1.73)	-0.18	1-7	3.07 (1.86)	3.12**

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	Earliest Age			Intensity			Disclosure		
Traumatic Event	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference
Illness or Injury									
Total	1-12	6.70 (3.03)		1-7	5.51 (1.44)		1-7	3.87 (2.07)	
Women	1-11	6.51 (2.48)		2-7	5.71 (1.27)		1-7	3.86 (2.10)	
Men	3-12	6.83 (3.50)	0.46	1-7	5.40 (1.54)	-0.99	1-7	3.84 (2.09)	-0.05
Other Trauma									
Total	1-16	7.32 (4.07)		2-7	6.28 (1.12)		1-7	2.88 (2.03)	
Women	1-16	7.08 (3.83)		2-7	6.23 (1.24)		1-7	3.05 (2.14)	
Men	1-15	7.60 (4.45)	0.62	4-7	6.36 (0.93)	0.54	1-7	2.55 (1.78)	-1.22

Note. $N = 396$. CTES = Childhood Traumatic Events Scale. Earliest Age of event experience is given in years. Intensity (i.e., how traumatic the event was) and disclosure (i.e., level of confidence in others about the event) were rated on a seven-point Likert-type scale, with higher numbers reflecting greater intensity and disclosure. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4

Crosstabulations Comparing CTES Responses to CEQ Responses for Comparable Variables

	CEQ Responses					
CTES Variables and Responses	No	I don't know, but I doubt it.	I don't know, but I suspect yes.	Yes	Total (%)	
Sexual Trauma (CTES) - Sexual Abuse (CEQ)						
No	239	14	14	4	271	(70.6)
Yes	3	1	9	100	113	(29.4)
Total (%)	242 (63.0)	15 (3.9)	23 (6.0)	104 (27.1)	384	(100.00)
Violence (CTES) - Physical Abuse (CEQ)						
No	183	20	13	18	234	(59.7)
Yes	14	2	16	126	158	(40.3)
Total (%)	197 (50.3)	22 (5.6)	29 (7.4)	144 (36.7)	392	(100.00)
Illness or Injury (CTES) - Medical Trauma (CEQ)						
No	277	18	6	6	307	(78.7)
Yes	23	3	7	50	83	(21.3)
Total (%)	300 (76.9)	21 (5.4)	13 (3.3)	56 (14.4)	390	(100.00)

Note. *N* = 396. CEQ = Childhood Experiences Questionnaire. CTES = Childhood Traumatic Events Scale.

Table 5

Descriptive Statistics of UCSEQ by Type of Abuse/Trauma and Sex

Traumatic Event	Number Reporting		
	Total (n = 100)	Female (n = 73)	Male (n = 26)
	f (%)	f (%)	f (%)
An invitation or request to do something sexual	41 (41.0)	32 (43.8)	9 (34.6)
Kissing or hugging in a sexual way	34 (34.0)	31 (42.5)	3 (11.5)
A person showing his/her sex organs to you	52 (52.0)	42 (57.5)	10 (38.5)
You showing your sex organs to a person	26 (26.0)	20 (27.4)	6 (23.1)
A person fondling you in a sexual way	66 (66.0)	52 (71.2)	13 (50.0)
You fondling a person in a sexual way	23 (23.0)	17 (23.3)	6 (23.1)
A person touching your sex organs	54 (54.0)	40 (54.8)	13 (50.0)
You touching a person's sex organs	32 (32.0)	27 (37.0)	5 (19.2)
A person orally touching your sex organs	22 (22.0)	17 (23.3)	4 (15.4)
You orally touching a person's sex organs	20 (20.0)	14 (19.2)	6 (23.1)
Intercourse, but without attempting penetration of the vagina	15 (15.0)	15 (20.5)	0 (0.0)
Vaginal intercourse (penile-vaginal penetration)	21 (21.0)	21 (28.8)	0 (0.0)
Anal intercourse (penile-anal penetration)	11 (11.0)	8 (11.0)	3 (11.5)
None of the Above	2 (2.0)	2 (2.7)	0 (0.0)
Prefer Not to Say	16 (16.0)	9 (12.3)	7 (26.9)

Note. UCSEQ= Unwanted Childhood Sexual Experiences Questionnaire. Number Reporting reflects the number and percentage reporting each event.

Table 6

Frequency of Post-Childhood Trauma (RTES) for Total Sample, and Women vs. Men

Traumatic Event	Number Reporting	
	f (%)	χ 2 for Sex Difference
Sexual Trauma		
Total (*N* = 392)	47 (12.0)	
Women (*N* = 194)	43 (22.2)	
Men (*N* = 197)	3 (1.5)	40.12***
Violence		
Total (*N* = 393)	68 (17.3)	
Women (*N* = 195)	39 (20.0)	
Men (*N* = 196)	29 (14.8)	1.84
Death		
Total (*N* = 391)	259 (66.2)	
Women (*N* = 197)	145 (73.6)	
Men (*N* = 192)	113 (58.9)	9.47**
Partner Upheaval		
Total (*N* = 392)	113 (28.8)	
Women (*N* = 196)	71 (36.2)	
Men (*N* = 194)	41 (21.1)	10.85***
Illness or Injury		
Total (*N* = 392)	78 (19.9)	
Women (*N* = 195)	42 (21.5)	
Men (*N* = 195)	36 (18.5)	0.58
Work Change		
Total (*N* = 388)	184 (47.4)	
Women (*N* = 195)	91 (46.7)	
Men (*N* = 191)	92 (48.2)	0.09
Other Trauma		
Total (*N* = 389)	75 (19.3)	
Women (*N* = 193)	41 (21.2)	
Men (*N* = 194)	33 (17.0)	1.12

Note. *N* = 396. RTES = Recent Traumatic Events Scale. Number Reporting reflects the number and percentage of participants in the sample reporting each event. Chi Square given reflects difference between men and women. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 7

Descriptive Statistics of Post-Childhood Trauma (RTES) for Total Sample, and Women vs. Men

	Recency[a]			Intensity			Disclosure		
Traumatic Event	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference
Sexual Trauma									
Total	0.05-47	12.64 (10.60)		4-7	6.09 (1.06)		1-7	2.70 (1.98)	
Women	0.05-47	13.00 (10.85)		4-7	6.07 (1.10)		1-7	2.60 (1.93)	
Men	0.25-16	10.08 (8.57)	-0.45	6-7	6.33 (0.58)	0.41	1-7	4.00 (3.00)	1.17
Violence									
Total	0.75-42	9.57 (8.07)		1-7	5.62 (1.61)		1-7	4.41 (2.08)	
Women	2.00-42	9.47 (8.29)		1-7	6.08 (1.35)		1-7	4.36 (2.22)	
Men	0.75-31	9.70 (7.93)	0.11	1-7	5.00 (1.75)	-2.87**	1-7	4.48 (1.92)	0.24
Death									
Total	0.06-53	8.73 (8.33)		1-7	5.76 (1.48)		1-7	4.67 (1.95)	
Women	0.06-44	7.92 (7.33)		1-7	6.01 (1.37)		1-7	4.89 (1.84)	
Men	0.42-53	9.81 (9.43)	1.76	1-7	5.42 (1.55)	-3.28**	1-7	4.38 (2.06)	-2.09*
Partner Upheaval									
Total	0.02-41	9.16 (9.15)		2-7	5.81 (1.52)		1-7	4.40 (2.08)	
Women	0.02-41	9.03 (9.48)		2-7	5.75 (1.55)		1-7	4.68 (2.01)	
Men	0.25-36	9.48 (8.78)	0.24	2-7	5.98 (1.44)	0.77	1-7	3.90 (2.15)	-1.91

Traumatic Event	Recency[a]			Intensity			Disclosure		
	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference	Range	*M* (*SD*)	*t* for Sex Difference
Illness or Injury									
Total	0.02-47	9.60 (10.44)		1-7	5.71 (1.42)		1-7	4.56 (1.98)	
Women	0.02-47	8.46 (11.24)		2-7	5.74 (1.40)		1-7	4.62 (1.95)	
Men	0.02-30.5	11.10 (9.23)	1.06	1-7	5.67 (1.45)	-0.22	1-7	4.50 (2.05)	-0.26
Work Change									
Total	0.04-37	5.61 (6.38)		1-7	3.35 (2.08)		1-7	4.03 (2.16)	
Women	0.04-37	5.43 (6.80)		1-7	3.52 (2.06)		1-7	4.12 (2.21)	
Men	0.17-26	5.84 (6.00)	0.40	1-7	3.22 (2.10)	-0.97	1-7	3.92 (2.13)	-0.62
Other Trauma									
Total	0.06-37.50	8.85 (9.54)		1-7	5.81 (1.87)		1-7	4.61 (2.18)	
Women	0.25-33	7.55 (8.37)		1-7	6.05 (1.73)		1-7	4.90 (2.17)	
Men	0.06-37.50	10.50 (10.86)	1.30	1-7	5.76 (1.87)	-0.91	1-7	4.18 (2.16)	-1.43

Note. $N = 396$. [a] Recency reflects how many years it has been since the most recent traumatic event. RTES = Recent Traumatic Events Scale Intensity (i.e., how traumatic the event was) and disclosure (i.e., level of confidence in others about the event) were rated on a seven-point Likert-type scale, with higher numbers reflecting greater intensity and disclosure. *$p < .05$. **$p < .01$.

Preliminary Analyses

Variables were checked for normality and three were identified as problematic. The item on the NDQ measuring nightmare frequency had notable skew and kurtosis. Log10 and square root transformations were attempted, but neither resulted in a normal distribution of the nightmare frequency item. Because of this, I created a binned variable to reflect the range and frequencies of scores: "0 nightmares a year", "1-2 nightmares a year", "2.5-8 nightmares a year", "9-13 nightmares a year", "14-31 nightmares a year", and 35-500 nightmares a year". Additionally, the SLEEP-50 Sleepwalking scale demonstrated extreme skew and kurtosis. Here binning was not an option as many people had a score of zero; thus, I dichotomized this variable into binary yes/no responses. Similarly, the PSQI-A item used to measure presence of sleep terrors demonstrated extreme skew and kurtosis, with many having a score of zero; thus, I also dichotomized this variable into binary yes/no responses. Means, standard deviations, skewness, kurtosis, Cronbach's alpha reliabilities, and mean inter-item correlations for all sleep variables are given in Table 8. The binned/binary versions of the three problematic variables described above are given in place of the original versions in correlational tables. Correlations among sleep variables can be seen in Table 9. Correlations between abuse variables (i.e., CSA, physical abuse, and post-childhood trauma) and sleep variables are in Table 10.

Table 8

Descriptive Statistics of Sleep Variables

Sleep Measure [a]	# of Items	Range	*M*	*SD*	Skew	Kurt	α	Inter-Item[b]
PSQI Global	7	0-21	8.30	4.08	0.44	-0.34	.76	.34
PSQI Subjective Sleep Quality[c]	1	0-3	1.55	0.83	0.17	-0.58	-	-
PSQI Sleep Latency [c]	2	0-6	2.62	1.95	0.23	-1.19	.83	.72
PSQI Sleep Duration [c]	1	2-11	6.24	1.34	-0.12	0.43	-	-
PSQI Habitual Sleep Efficiency[c]	1	33.33-100	84.93	13.01	-1.00	1.11	-	-
PSQI Sleep Disturbances [c]	9	0-25	9.12	5.33	0.35	-0.52	.63	.15
PSQI Use of Sleep Medication [c]	1	0-3	0.72	1.13	1.20	-0.24	-	-
PSQI Daytime Dysfunction [c]	2	0-6	1.94	1.54	0.52	-0.47	.54	.37
PSQI-A Global	7	0-21	4.88	4.33	0.90	0.19	.81	.38
PSQI-A Episodes of Terror	1	0-3	0.30	0.70	2.58	6.20	-	-
PSQI-A Episodes of Terror, binary	1	0-1	0.19	0.40	1.57	0.46	-	-
NDQ Frequency	1	0-500	21.46	53.86	4.80	27.84	-	-
NDQ Nightmare Frequency, binned	1	0-5	2.18	1.67	0.28	-1.10	-	-
WUSEQ Frequency	1	0-6	1.18	1.48	1.15	0.80	-	-
S50 Sleep Apnea	8	0-24	5.70	4.57	1.32	1.91	.76	.30
S50 Insomnia	8	0-24	11.34	6.65	0.12	-0.86	.90	.52
S50 Narcolepsy	5	0-15	2.46	3.07	1.65	2.44	.77	.42
S50 RLS/PLMD	4	0-12	2.14	2.95	1.74	2.46	.84	.57
S50 Circadian Rhythm	3	0-9	2.27	2.18	0.80	-0.13	.57	.30
S50 Sleepwalking	3	0-9	0.48	1.34	3.36	11.98	.82	.61
S50 Sleepwalking, binary	1	0-1	0.16	0.37	1.85	1.41	-	-
S50 Nightmares	5	0-14	5.30	4.19	0.08	-1.14	.87	.57
S50 Nightmare Frequency item	1	0-3	1.09	0.95	0.59	-0.53	-	-
S50 Factors Influencing Sleep	7	0-19.60	4.03	3.76	1.13	0.92	.69	.25[d]
S50 Impact	7	0-21	9.57	5.87	0.19	-0.98	.91	.58

Note. $N = 396$. [a] Higher numbers indicate greater dysfunction or symptomology. [b] Mean Inter-Item Correlation. [c] Raw (not component) score. [d] Subscale contains theoretically unrelated items. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; PSQI-A Episodes of Terror = Item on PSQI-A measuring sleep terrors; NDQ = Nightmare Distress Questionnaire; WUSEQ = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder; S50 Impact = Impact of Sleep Complaints on Daily Functioning.

Table 9

Intercorrelations of Sleep Variables

Measure	2	3	4	5	6	7	8	9	10	11	12
1. PSQI Global	.76***	.70***	-.64***	-.70***	.68***	.55***	.66***	.61***	.30***	.38***	.38***
2. PSQI Subjective Sleep Quality [a]	-	.48***	-.55***	-.44***	.51***	.25***	.43***	.44***	.20***	.35***	.28***
3. PSQI Sleep Latency [a]		-	-.29***	-.41***	.40***	.27***	.40***	.42***	.19***	.28***	.30***
4. PSQI Sleep Duration [a]			-	.56***	-.34***	-.19***	-.28***	-.25***	-.11*	-.25***	-.23***
5. PSQI Habitual Sleep Efficiency [a]				-	-.41***	-.23***	-.40***	-.32***	-.12*	-.21***	-.19***
6. PSQI Sleep Disturbances [a]					-	.27***	.54***	.62***	.34***	.35***	.29***
7. PSQI Use of Sleep Medication [a]						-	.23***	.33***	.21***	.13**	.14**
8. PSQI Daytime Dysfunction [a]							-	.59***	.31***	.29***	.32***
9. PSQI-A Global								-	.63***	.47***	.39***
10. PSQI-A Episodes of Terror, binary									-	.25***	.25***
11. NDQ Nightmare Frequency, binned										-	.31***
12. WUSEQ Frequency											-
13. S50 Sleep Apnea											
14. S50 Insomnia											
15. S50 Narcolepsy											
16. S50 RLS/PLMD											
17. S50 Circadian Rhythm											
18. S50 Sleepwalking, binary											
19. S50 Nightmares											
20. S50 Nightmare Frequency item											
21. S50 Factors Influencing Sleep											
22. S50 Impact											

	Measure	13	14	15	16	17	18	19	20	21	22
1.	PSQI Global	.46***	.76***	.45***	.43***	.42***	.15**	.46***	.47***	.49***	.70***
2.	PSQI Subjective Sleep Quality [a]	.29***	.65***	.30***	.29***	.39***	-.01	.37***	.40***	.32***	.62***
3.	PSQI Sleep Latency [a]	.26***	.63***	.22***	.26***	.30***	.03	.32***	.32***	.33***	.48***
4.	PSQI Sleep Duration [a]	-.25***	-.46***	-.19***	-.23***	-.29***	-.04	-.22***	-.24***	-.16**	-.42***
5.	PSQI Habitual Sleep Efficiency [a]	-.21***	-.42***	-.26***	-.22***	-.19***	-.10	-.24***	-.29***	-.19***	-.39***
6.	PSQI Sleep Disturbances [a]	.56***	.63***	.45***	.50***	.27***	.25***	.49***	.49***	.42***	.59***
7.	PSQI Use of Sleep Medication [a]	.29***	.33***	.24***	.19***	.15**	.16**	.21***	.20**	.38***	.28***
8.	PSQI Daytime Dysfunction [a]	.42***	.55***	.56***	.41***	.43***	.26***	.42***	.42***	.58***	.65***
9.	PSQI-A Global	.55***	.64***	.64***	.55***	.38***	.34***	.64***	.64***	.64***	.63***
10.	PSQI-A Episodes of Terror, binary	.44***	.31***	.51***	.41**	.20***	.36***	.43***	.42***	.41***	.29***
11.	NDQ Nightmare Frequency, binned	.24***	.44***	.23***	.15**	.16 **	.04	.63***	.68***	.24***	.40***
12.	WUSEQ Frequency	.24***	.38***	.39***	.33***	.25***	.02	.38***	.35***	.31***	.34***
13.	S50 Sleep Apnea	-	.47***	.62***	.60***	.31***	.35***	.49***	.44***	.48***	.45***
14.	S50 Insomnia		-	.47***	.44***	.44***	.11*	.53***	.51***	.48***	.72***
15.	S50 Narcolepsy			-	.59***	.41***	.45***	.50***	.48***	.58***	.47***
16.	S50 RLS/PLMD				-	.28***	.39***	.42***	.40***	.45***	.42***
17.	S50 Circadian Rhythm					-	.15**	.31***	.27***	.50***	.49***
18.	S50 Sleepwalking, binary						-	.28***	.27***	.34***	.14**
19.	S50 Nightmares							-	.89***	.43***	.53***
20.	S50 Nightmare Frequency item								-	.41***	.53***
21.	S50 Factors Influencing Sleep									-	.58***
22.	S50 Impact										-

Note. $N = 396$. [a] denotes raw scores. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; PSQI-A Episodes of Terror = Item on PSQI-A measuring sleep terrors; NDQ = Nightmare Distress Questionnaire; WUSEQ = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder; S50 Impact = Impact of Sleep Complaints on Daily Functioning. $^{*}p<.05$. $^{**}p<.01$. $^{***}p<.001$.

Table 10

Intercorrelations among Abuse and Sleep Variables

	CSA [a] ($N = 339$)[b]	PA [a] ($N = 339$)[b]	Post-Childhood Trauma ($N = 396$)
CSA [a]	-	.16**	.23***
PA [a]	.16**	-	.26**
Post-Childhood Trauma [c]	.23***	.26**	-
PSQI Global	.22***	.26***	.36***
PSQI Subjective Sleep Quality [d]	.20***	.16**	.27***
PSQI Sleep Latency [d]	.05	.16**	.22***
PSQI Sleep Duration [d]	-.16**	-.16**	-.30***
PSQI Habitual Sleep Efficiency [d]	-.14*	-.14*	-.24***
PSQI Sleep Disturbances [d]	.25***	.22***	.32***
PSQI Use of Sleep Medication [d]	.10	.17**	.18***
PSQI Daytime Dysfunction [d]	.19***	.25***	.23***
PSQI-A Global	.28***	.32***	.26***
PSQI-A Episodes of Terror, binary	-.02	-.03	-.03
NDQ Nightmare Frequency, binned	.28***	.29***	.19***
WUSEQ Frequency	.21***	.24***	.19***
S50 Sleep Apnea	.21***	.19***	.23***
S50 Insomnia	.19***	.25***	.37***
S50 Narcolepsy	.23***	.23***	.17***
S50 RLS/PLMD	.21***	.11*	.22***
S50 Circadian Rhythm	.05	.13*	.14**
S50 Sleepwalking, binary	.13*	.05	.00
S50 Nightmares	.26***	.22***	.18***
S50 Nightmare Frequency item	.26***	.23***	.19***
S50 Factors Influencing Sleep	.14**	.25***	.13**
S50 Impact	.20***	.23***	.27***

Note. [a] Yes to relevant items on CTES and CEQ; CSA = Childhood Sexual Abuse; PA = Childhood Physical Abuse. [b] These numbers are below 396 because they reflect those who answered "Yes" on CEQ and CTES or "No" on CEQ and CTES. [c] Mean of all RTES items. [d] Raw component score. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; PSQI-A Episodes of Terror = Item on PSQI-A measuring sleep terrors; NDQ = Nightmare Distress Questionnaire; WUSEQ = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder; S50 Impact = Impact of Sleep Complaints on Daily Functioning. *p <.05. **p <.01. ***p <.001.

Comparing Sexual Abuse to Other Forms of Abuse

It was hypothesized that those who experienced CSA would have poorer overall sleep than their non-abused peers. Additionally, it was hypothesized that people with a history of CSA would show different patterns of sleep dysfunction than those with a history of physical abuse. For the purposes of hypotheses testing, the sample was reduced to 234: those who experienced CSA but not physical abuse (n = 65), those who experienced only physical abuse but not CSA (n = 91), those who experienced both CSA and physical abuse (n = 35), and those who did not experience *any* childhood abuse/trauma (including trauma other than CSA and physical abuse; n = 43). Hereafter, the groups will be called CSA Only, PA Only, Both CSA/PA, and No Trauma for the ease of communicating data, but many in the first three abuse groups experienced other forms of abuse/trauma. Means and standard deviations for dependent variables by abuse groups are given in Table 11. Groups were compared by means of MANOVA for variables that met the relevant assumptions and by non-parametric Kruskal-Wallis tests for variables that did not meet the assumptions for MANOVA.

Of these 234 participants, 124 identified as female, 108 as male, 1indicated gender identity (genderqueer) instead of biological sex, and 1 participant's response was in Russian and was labeled as missing data (for that item). The participant who identified as genderqueer was in the Both CSA/PA group while the participant whose response was in Russian was in the PA Only group. Overall, participants' ages ranged from 21 to 70 (M = 35.19, SD = 10.42). Like the initial sample, the reduced sample was mostly Caucasian (80.3%). Of the remaining, 9% identified as African American, 3.8% Asian, 0.9% Hispanic or Latino, 2.1% Caucasian/Hispanic or Latino, 1.7% Caucasian/Native American, and 2% other mixed ethnic background. In general, this was an educated sample: 9% had completed a professional degree; 31.6% had completed a

university undergraduate degree; 16.7% had completed a college/apprenticeship diploma and/or a technical diploma; 32.9% had completed some of college, university, or an apprenticeship program; 8.5% had completed high school; and 1.3% had not completed high school. Regarding employment, 64.1% were full-time employees, 12.6% part-time, 11.3% unemployed, and 3% retired; 9% selected other and 1.3% selected “Prefer Not to Say”.

Table 11

Means and Standard Deviations for Dependent Variables by Childhood Abuse Group

	CSA Only		PA Only		Both CSA/PA		No Trauma	
Dependent Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PSQI Global	8.97	3.95	8.69	4.02	10.71	4.62	5.36	3.11
PSQI Subjective Sleep Quality [a]	1.78	0.76	1.55	0.79	1.89	0.90	1.02	0.77
PSQI Sleep Latency [a]	2.68	1.97	3.03	2.09	2.80	1.92	1.91	1.80
PSQI Sleep Duration [a]	6.12	1.36	6.20	1.24	5.61	1.52	6.81	1.13
PSQI Habitual Sleep Efficiency [a]	84.68	12.25	85.45	11.07	81.39	14.25	90.79	8.87
PSQI Sleep Disturbances [a]	10.63	5.21	9.35	4.95	11.66	6.26	6.42	4.81
PSQI Use of Sleep Medication [a]	0.78	1.14	0.78	1.16	1.06	1.33	0.37	0.98
PSQI Daytime Dysfunction [a]	2.09	1.51	2.07	1.50	2.83	1.69	1.33	1.36
PSQI-A Global	5.43	4.58	5.35	4.19	8.60	5.24	1.81	1.82
PSQI-A Episodes of Terror, binary	0.19	0.39	0.15	0.36	0.49	0.51	0.00	0.00
NDQ Nightmare Frequency, binned	2.48	1.65	2.40	1.57	3.34	1.62	1.40	1.29
WUSEQ Frequency	1.38	1.85	1.22	1.30	2.06	1.53	0.58	1.03
S50 Sleep Apnea	6.02	4.18	5.82	4.09	7.88	5.61	3.12	2.27
S50 Insomnia	12.45	6.56	12.15	6.72	14.23	6.77	6.70	5.19
S50 Narcolepsy	2.69	2.84	2.30	2.65	4.77	4.53	0.93	1.33
S50 RLS/PLMD	2.39	2.84	1.57	2.17	3.76	4.11	0.59	1.28
S50 Circadian Rhythm	2.06	2.08	2.40	2.34	2.83	2.39	1.40	1.58
S50 Sleepwalking, binary	0.17	0.38	0.00	0.00	0.31	0.47	0.00	0.00
S50 Nightmares	6.29	3.78	5.66	4.08	7.70	4.32	3.02	3.25
S50 Nightmare Frequency item	1.29	0.95	1.18	0.93	1.69	1.11	0.56	0.59
S50 Factors Influencing Sleep	3.94	3.83	4.23	3.42	5.80	4.85	2.30	2.27
S50 Impact	10.48	5.78	9.99	5.58	12.40	6.19	6.47	4.76

Note. $N = 234$. [a] Raw component scores. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; PSQI-A Episodes of Terror = Item on PSQI-A measuring sleep terrors; NDQ = Nightmare Distress Questionnaire; WUSEQ = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder; S50 Impact = Impact of Sleep Complaints on Daily Functioning.

MANOVA assumptions. Prior to the main analyses, I screened data for potential univariate outliers within each group (in contrast to earlier analyses that were based on the entire sample). I reviewed the relevant dependent variables (i.e., PSQI raw scores, PSQI Global score, PSQI-A Global score, binary PSQI-A episodes of terror item, binned NDQ nightmare frequency item, WUSEQ frequency item, all SLEEP-50 subscales with the binary Sleepwalking subscale, and SLEEP-50 nightmare frequency item) separately within each group. Outliers were defined as participants having z-scores greater than |3|; a total of 24 outlying scores were identified amongst these variables. I identified one outlier on the PSQI Global score in the No Trauma group with a z-score of 3.20 and one outlier on the PSQI Sleep Duration component raw score in the No Trauma group with a z-score of 3.48. I identified three total outliers on the PSQI Habitual Sleep Efficiency component raw score, with two in the PA Only group with z-scores of -3.30 and -3.79 as well as one in the Both CSA/PA group with a z-score of -3.66. I also identified one outlier on the PSQI-A global score in the No Trauma group with a z-score of 3.33.

I also identified two outliers on the WUSEQ frequency item with z-scores of 3.19 in the PA Only group. I identified two outliers on the SLEEP-50 Apnea subscale with z-scores of 3.03 (No Trauma group) and 3.42 (CSA Only group), two outliers on the SLEEP-50 Narcolepsy subscale with z-scores of from 3.40 (PA Only group) and 4.06 (No Trauma group), and three outliers on the SLEEP-50 RLS/PLMD subscale with z-scores of 3.09 (CSA Only group), 3.58 (PA Only group), and 4.75 (No Trauma group). And finally, I identified nine outliers on the binary SLEEP-50 Sleepwalking subscale with eight outliers in the PA Only group with z-scores of 3.14 and one outlier in the No Trauma group with a z-score of 6.33. Careful review of responses associated with outliers did not indicate randomness or carelessness; however, given that MANOVA is sensitive to outliers and a large number of z-scores fell outside the acceptable

boundaries, these individual responses were removed from further analysis to minimize the impact these outliers would have on results.

I then screened for normality amongst the same dependent variables within each group to test the assumption of normality. Four variables exhibited skewness or kurtosis greater than ±2. The PSQI Sleep Duration component raw score was significantly kurtotic in the No Trauma group (kurtosis = 4.01) and the PSQI Sleep Medication component raw score was significantly skewed and kurtotic in the No Trauma group (skewness = 2.39, kurtosis = 4.00). The SLEEP-50 RLS-PLMD subscale was also significantly skewed and kurtotic in the No Trauma group (skewness = 2.78, kurtosis = 8.21). The binary PSQI-A item measuring episodes of terror was skewed and kurtotic in the PA Only group (skewness = 2.02, kurtosis = 2.13) and kurtotic in the Both CSA/PA group (kurtosis = -2.12). Additionally, two variables demonstrated no variability within groups, precluding analysis: for the binary PSQI-A item measuring episodes of terror, scores were constant at 0 in the No Trauma group. Thus, it is clear that only those with abuse histories reported sleep terrors. The binary SLEEP-50 Sleepwalking subscale demonstrated no variability (i.e., scores were constant at 0) in not only the No Trauma group, but also in the PA Only group. Thus, only those who reported having had experienced CSA or Both CSA/PA reported sleepwalking.

Both skewed and kurtotic variables violating the assumption of normality as well as variables demonstrating no variability within groups were removed from the MANOVA. Specifically, these variables included PSQI Sleep Duration component raw scores, PSQI Sleeping Medication component raw scores, the SLEEP-50 RLS/PLMD subscale, the binary PSQI-A Episodes of Terror item, and the binary SLEEP-50 Sleepwalking subscale.

The assumption of equal variances in each group was tested using Levene's Test of Equality of Error Variances for all 17 sleep variables that demonstrated adequate normality. The assumption of homogeneity of variance was violated for a number of variables, including PSQI Habitual Sleep Efficiency component raw scores, $F(3, 191) = 5.08$, $p = .002$, PSQI-A global score, $F(3, 191) = 9.28$, $p < .001$, WUSEQ frequency, $F(3, 191) = 7.36$, $p < .001$, SLEEP-50 Sleep Apnea subscale, $F(3, 191) = 6.69$, $p < .001$, SLEEP-50 Narcolepsy subscale, $F(3, 191) = 16.60$, $p < .001$, SLEEP-50 Circadian Rhythm Sleep Disorder subscale, $F(3, 191) = 5.30$, $p = .002$, the SLEEP-50 Factors Influencing Sleep subscale, $F(3, 191) = 8.08$, $p < .001$, and the SLEEP-50 Nightmare subscale item measuring Nightmare Frequency, $F(3, 191) = 3.71$, $p = .01$. These non-homogenous variables were removed from analysis. To ensure the remaining variables had equal variances, Levene's was run once more on the nine remaining sleep variables. One variable, PSQI Subjective Sleep Quality component raw scores, violated homogeneity, $F(3, 209) = 3.25$, $p = .02$. This variable was removed from further analyses to increase statistical power of the following test. Bivariate correlations were also examined to assess the assumption that dependent variables would be not strongly associated with each other. As evident in Table 10, the absence of high correlations (e.g., $r > \pm .90$) between the remaining predictor variables suggests that multicollinearity is not a concern. Additionally, Box's Test of Equality of Covariance Matrices was conducted. This test is sensitive to even small deviations from homogeneity and normality. A Box's M value of 163.11 was associated with a non-significant p value of .01; thus, equal covariance matrices are assumed and Wilk's Lambda will be reported below.

MANOVA results. To understand if significant differences exist among abuse/trauma groups (i.e., CSA Only, PA Only, Both CSA/PA, and No Trauma), a multivariate analysis of variance (MANOVA) was performed on the eight remaining sleep-related dependent variables

(i.e., PSQI Global score; PQSI components Sleep Latency, Sleep Disturbances, and Daytime Dysfunction; binned Nightmare Frequency as measured by the NDQ; and the SLEEP-50 subscales for Insomnia, Nightmares, and Impact of Sleep Complaints on Daily Functioning). The MANOVA for abuse group was statistically significant, Wilk's Lambda = .72, $F(24,586.46) = 2.89$, $p < .001$. The multivariate effect size (partial eta squared) was 0.102, which implies that abuse group membership explained 10.2% of the variance in the canonically derived dependent variable. Univariate tests revealed the abuse groups to have a statistically significant effect on each dependent variable, including the PSQI Global score ($F(3,209) = 11.94$, $p < .001$, $\eta_p^2 = .146$), PSQI Sleep Latency component raw score ($F(3,209) = 4.28$, $p < .01$, $\eta_p^2 = .058$), PSQI Sleep Disturbances component raw score ($F(3,209) = 7.66$, $p < .001$, $\eta_p^2 = .099$), PSQI Daytime Dysfunction component raw score ($F(3,209) = 6.91$, $p < .001$, $\eta_p^2 = .09$), binned NDQ Nightmare Frequency score ($F(3,209) = 9.89$, $p < .001$, $\eta_p^2 = .124$), SLEEP-50 Insomnia subscale ($F(3,209) = 11.02$, $p < .001$, $\eta_p^2 = .137$), SLEEP-50 Nightmares subscale ($F(3,209) = 9.17$, $p < .001$, $\eta_p^2 = .116$), and SLEEP-50 Impact of Sleep Complaints on Daily Functioning subscale ($F(3,209) = 7.51$, $p < .001$, $\eta_p^2 = .097$). Univariate tests as well as means and standard deviations are given for each group in Table 12.

As the omnibus test was significant, I used post-hoc Tukey's HSD to evaluate mean differences between abuse groups (i.e., CSA Only, PA Only, Both CSA/PA, and No Trauma) for all variables that met the assumptions of parametric testing. I then performed Kruskal-Wallis tests on all remaining variables. As this test requires continuous data, I used the original (i.e., non-binary) PSQI-A Episodes of Terror item and S50 Sleepwalking subscale variables. When a comparison between two groups reaches significance on a variable, the two groups are said to be significantly different on that variable. Significant Tukey's HSD post-hoc group comparisons are

denoted with subscripts in Table 12, while significance levels of those from Kruskal-Wallis group comparisons are given in Table 13.

Use of these tests allowed me to address the first two hypotheses. I first hypothesized that those who have experienced CSA would have poorer overall sleep when compared to their non-abused peers. Tukey's HSD revealed that CSA Only was significantly different from No Trauma on every measure of sleep except for PSQI Sleep Latency. These results support the hypothesis and suggest that CSA has an enduring impact on sleep, though it is not associated with longer sleep latencies, when compared to no abuse/trauma. On the other hand, Kruskal-Wallis tests revealed more mixed support for the hypothesis that those who have experienced CSA would have poorer overall sleep than their non-abused peers. CSA Only was not significantly different from No Trauma on a number of variables, including PSQI Habitual Sleep Efficiency and Use of Sleep Medication subscales; the PSQI-A Episodes of Terror item; WUSEQ Frequency; and S50 Circadian Rhythm Sleep Disorder, Sleepwalking, and Factors Influencing Sleep subscales.

I also hypothesized that those with histories of CSA would show different patterns of sleep dysfunction than those with a history of physical abuse. As evident in Tables 13 and 14, no significant differences were found between the CSA and PA groups.

Disorders of arousal. Furthermore, it was secondarily hypothesized that those who experienced PA Only would report greater disorders of arousal (e.g., sleepwalking and sleep terrors) than those who experienced CSA Only. There were no significant differences between CSA Only and PA Only on disorders of arousal.

Table 12

Univariate Tests and Childhood Abuse Group Means by Dependent Variable

	ANOVAs			CSA Only (n = 59)		PA Only (n = 81)		Both CSA/PA (n = 32)		No Trauma (n = 41)	
Dependent Variable	*F*	*p*	η_p^2	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PSQI Global	11.94	.00	.146	8.92_{c}	4.02	8.86_{c}	4.06	10.38_{c}	4.35	5.29_{b}	3.12
PSQI Sleep Latency [a]	4.28	.01	.058	2.59_{b}	1.98	3.10_{c}	2.10	2.59_{b}	1.88	1.76_{b}	1.69
PSQI Sleep Disturbances [a]	7.66	.00	.099	10.25_{c}	5.24	9.32_{c}	5.04	11.22_{c}	6.17	6.02_{b}	4.33
PSQI Daytime Dysfunction [a]	6.91	.00	.090	2.03_{c}	1.44	2.12_{c}	1.49	2.75_{c}	1.67	1.22_{b}	1.26
NDQ Nightmare Frequency, binned	9.89	.00	.124	$2.53_{c,d}$	1.63	2.40_{c}	1.57	3.34_{d}	1.62	1.39_{b}	1.30
S50 Insomnia	11.02	.00	.137	12.12_{c}	6.40	12.25_{c}	6.63	13.57_{c}	6.66	6.29_{b}	4.95
S50 Nightmares	9.17	.00	.116	5.93_{c}	3.69	5.45_{c}	4.10	7.48_{c}	4.43	2.88_{b}	3.25
S50 Impact	7.51	.00	.097	10.02_{c}	5.45	9.94_{c}	5.57	12.10_{c}	6.26	6.24_{b}	4.74

Note. $N = 234$. [a] Component raw scores. Subscripts b – d reflect homogeneous subsets within each variable. η_p^2 = Partial eta squared. PSQI = Pittsburgh Sleep Quality Index; S50 = SLEEP-50; S50 Impact = Impact of Sleep Complaints on Daily Functioning.

Table 13

Significance of Kruskal-Wallis[a] *Group Comparisons for Dependent Variables that Do Not Meet Requirements for Parametric Analyses*

	Abuse Groups		
Dependent Variable	PA Only	Both CSA/PA	No Abuse or Trauma
PSQI Subjective Sleep Quality [b]			
CSA Only	.456	1.000	.000
PA Only	-	.380	.005
Both CSA/PA	-	-	.000
PSQI Sleep Duration [b]			
CSA Only	1.000	.575	.026
PA Only	-	.503	.013
Both CSA/PA	-	-	.000
PSQI Habitual Sleep Efficiency [b]			
CSA Only	1.000	1.000	.088
PA Only	-	.933	.111
Both CSA/PA	-	-	.009
PSQI Use of Sleep Medication [b]			
CSA Only	1.000	1.000	.138
PA Only	-	1.000	.139
Both CSA/PA	-	-	.044
PSQI-A Global			
CSA Only	1.000	.027	.000
PA Only	-	.022	.000
Both CSA/PA	-	-	.000
PSQI-A Episodes of Terror [c]			
CSA Only	1.000	.001	.115
PA Only	-	.000	.350
Both CSA/PA	-	-	.000
WUSEQ Frequency			
CSA Only	1.000	.046	.132
PA Only	-	.045	.064
Both CSA/PA	-	-	.000
S50 Sleep Apnea			
CSA Only	1.000	.980	.001
PA Only	-	.516	.001
Both CSA/PA	-	-	.000

Dependent Variable	Abuse Groups		
	PA Only	Both CSA/PA	No Abuse or Trauma
S50 Narcolepsy			
CSA Only	1.000	.195	.003
PA Only	-	.016	.022
Both CSA/PA	-	-	.000
S50 RLS/PLMD			
CSA Only	.721	.445	.002
PA Only	-	.009	.091
Both CSA/PA	-	-	.000
S50 Circadian Rhythm			
CSA Only	1.000	.732	.810
PA Only	-	1.000	.139
Both CSA/PA	-	-	.040
S50 Sleepwalking [c]			
CSA Only	.682	.247	.147
PA Only	-	.003	1.000
Both CSA/PA	-	-	.001
S50 Nightmare Frequency			
CSA Only	1.000	.575	.000
PA Only	-	.118	.002
Both CSA/PA	-	-	.000
S50 Factors Influencing Sleep			
CSA Only	1.000	.459	.212
PA Only	-	1.000	.016
Both CSA/PA	-	-	.003

Note. $N = 234$. [a] $\alpha = 0.05$, two sided; adjusted significances given. [b] denotes raw scores. [c] original (not binary) variable. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; NDQ = Nightmare Distress Questionnaire; WUSEQ Frequency = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder.

Post-Childhood Trauma as a Mediator of the Relation between CSA and Adult Sleep

Prior hypotheses examined whether sleep disturbance in adulthood is unique to sexual abuse or due more generally to trauma; thus, comparisons were drawn between pure groups (e.g., CSA without concurrent physical abuse). My final hypothesis examines the role of post-childhood abuse/trauma, hereafter referred to as "Recent Trauma", in the relation between CSA and adult sleep disturbance. The following analyses include all participants who had experienced CSA, including those who had also experienced physical abuse in childhood.

In my final cluster of hypotheses, I expected that CSA would be associated with more trauma post childhood. Furthermore, I anticipated that this recent trauma would be correlated with greater sleep disruption and that it would play a mediating role in the relation between CSA and poor sleep quality. As evident in Table 10, CSA and Recent Trauma were positively correlated, $r = .23$, $p < .001$. Multiple linear regressions were performed to determine if experience of recent trauma explains the relation between CSA and adult sleep problems.

Testing of assumptions for multiple regression. Data were screened for outliers. First, Mahalanobis distance scores were examined using a Chi-square critical value, determined by a criterion of $\alpha = .001$ with *df* equal to the number of predictor variables, or 13.82 (Tabachnick & Fidell, 2012). As the largest Mahalanobis distance (11.60) did not surpass the Mahalanobis critical value, no outliers are expected. Likewise, as Cook's Distances were well below |1|, no participant was considered to be overly influential. Data were also tested to see if multicollinearity was a concern; this assumption was met for all variables as the lowest tolerance level (0.94) was above 0.10 and the greatest variance inflation factor (1.43) did not exceed 10. Visual inspection of scatter plots with recent trauma indicated that the data met the assumption of linearity. Visual inspection of standardised residuals indicated that the data met the

assumption of homoscedasticity and were evenly spread over the range of independent variables, excepting three variables: the original PSQI-A Episodes of Terror item, the binned NDQ Nightmare Frequency, and the original SLEEP-50 Sleepwalking subscale. Visual inspection of P-P plots of standardized residuals indicated that a number of variables seemed to deviate from the superimposed line so standardized residuals were examined to further examine the assumption of normality. This confirmed that the data contained non-normally distributed errors with values of ±3.29 for some variables (i.e., PSQI Sleep Efficiency component raw scores; PSQI-A Global; PSQI-A Episodes of Terror item; binned NDQ Nightmare Frequency, WUSEQ Frequency; and SLEEP-50 Sleep Apnea, Narcolepsy, RLS/PLMD, Sleepwalking subscales). However, only three of these variables exhibited skewness or kurtosis greater than ±2: the original PSQI-A Episodes of Terror item, the binned NDQ Nightmare Frequency, and the original SLEEP-50 Sleepwalking subscale. Thus, as these three variables failed to meet the assumptions of normality and homoscedasticity, these variables were not included in mediation analyses.

Mediation. Recent Trauma was examined as a possible mediator for the twenty variables that met assumptions of multiple regression. Analyses were run with PROCESS v2.16, a macro for SPSS (Hayes, 2013), on the basis of Baron and Kenny (1986). Baron and Kenny (1986) laid out four conditions – or steps – that must be met for a variable to act as a mediator: 1) The independent variable must predict the dependent variable; 2) the independent variable (CSA, in this case) must predict the mediating variable (Recent Trauma); 3) the mediating variable must predict the dependent variable (the sleep variables); and 4) the independent variable must either no longer predict or be lessened in predicting the dependent variable when the moderating variable is held constant. The authors described full mediation as the case in which the

independent variable is no longer a significant predictor of the dependent variable. In the case that the independent variable is lessened in predicting the dependent variable, partial mediation is indicated. As such, results were described as partial, full, or no mediation. According to Baron & Kenny (1986), each step is examined in order and analysis stops at the point that a step fails. However, since their publication, it is now widely acknowledged that Step 1 is not critical and, as such, mediation may exist without it being significant. Thus, I proceeded onto Step 2 even if a sleep outcome did not demonstrate a significant relation to CSA in Step 1. Additionally, while Baron and Kenny (1986) used the Sobel test to test whether the indirect effect was significant, more recent work has found examining the bootstrapped indirect effect is a more powerful test of significance (Hayes, 2010; Preacher & Hayes, 2004; Zhao, Lynch, & Chen, 2010). The bootstrapped effect is significant when the number zero is not between the confidence interval lower and upper limits (Shrout & Bolger, 2002). As such, the present study assessed significance by examining confidence intervals using bootstrapping with 5000 replications. The hypothesized mediation model, to which all mediation analyses conformed, is given in Figure 1. A summary of results for all analyses is in Table 14.

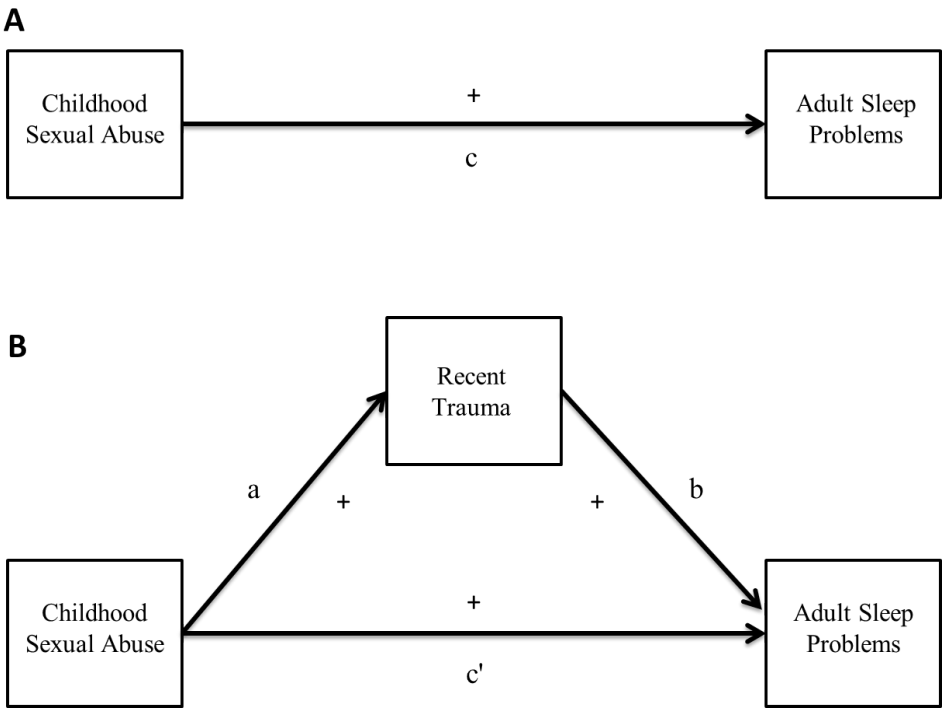

Figure 1. Hypothesized mediation model showing the association between childhood sexual abuse and adult sleep problems as mediated by recent trauma. Path a represents the positive effect of childhood sexual abuse on recent trauma. Path b represents the positive effect of recent trauma on adult sleep problems. Path c represents the represents the positive direct effect of childhood sexual abuse on adult sleep (i.e., increased sleep problems). Path c' represents the effect of childhood sexual abuse on adult sleep after controlling for recent trauma**.**

Table 14

Results of Mediation Analyses by Dependent Variable

Dependent Variable	Mediation-model path, Unstandardized path coefficients				CIs [a]	Significant Effects
	Path a (Step 2)	Path b (Step 3)	Path c (Step 1)	Path c' (Step 4)		
PSQI Global	0.11***	6.37***	1.96***	1.28**	0.34 – 1.15 [c]	Direct & Indirect
PSQI Subjective Sleep Quality [b]	0.11***	0.93***	0.37***	0.27**	0.05 – 0.18 [c]	Direct & Indirect
PSQI Sleep Latency [b]	0.11***	1.97***	0.19	-0.02	0.09 – 0.39 [c]	Indirect Only
PSQI Sleep Duration [b]	0.11***	-1.90***	-0.47**	-0.26	-0.35 – -0.10 [c]	Indirect Only
PSQI Sleep Efficiency [b]	0.10***	-14.19***	-3.93*	-2.49	-2.66 – -0.63 [c]	Indirect Only
PSQI Sleep Disturbances [b]	0.11***	7.13***	2.93***	2.17***	0.35 – 1.29 [c]	Direct & Indirect
PSQI Sleep Medication [b]	0.11***	0.83**	0.25	0.16	0.03 – 0.19 [c]	Indirect Only
PSQI Daytime Dysfunction [b]	0.11***	1.45***	0.66***	0.51**	0.07 – 0.29 [c]	Direct & Indirect
PSQI-A Global	0.11***	4.08***	2.65***	2.21***	0.19 – 0.80 [c]	Direct & Indirect
WUSEQ Frequency	0.11***	1.07**	0.70***	0.58**	0.03 – 0.24 [c]	Direct & Indirect
S50 Sleep Apnea	0.11***	4.71***	2.00***	1.50**	0.23 – 0.94 [c]	Direct & Indirect
S50 Insomnia	0.11***	10.79***	2.78***	1.63*	0.58 – 1.86 [c]	Direct & Indirect
S50 Narcolepsy	0.11***	1.87*	1.50***	1.30***	0.06 – 0.42 [c]	Direct & Indirect
S50 RLS/PLMD	0.11***	2.88***	1.32***	1.01**	0.12 – 0.58 [c]	Direct & Indirect
S50 Circadian Rhythm	0.11***	1.31*	0.21	0.07	0.04 – 0.30 [c]	Indirect Only
S50 Nightmares	0.11***	2.40*	2.39***	2.14***	0.05 – 0.55 [c]	Direct & Indirect
S50 Nightmare Frequency	0.11***	0.59*	0.55***	0.48***	0.02 – 0.13 [c]	Direct & Indirect
S50 Factors Influencing Sleep	0.11***	1.91*	1.14**	0.93*	0.02 – 0.50 [c]	Direct & Indirect
S50 Impact	0.11***	6.67***	2.60***	1.89**	0.36 – 1.25 [c]	Direct & Indirect

Note. [a] Confidence Intervals for indirect effect, bootstrapped with 5000 replications; [b] Component raw scores. [c] Confidence Interval is significant as it excludes zero. See Figure 1 for description of paths. PSQI = Pittsburgh Sleep Quality Index; S50 = SLEEP-50; S50 Impact = Impact of Sleep Complaints on Daily Functioning. PSQI = Pittsburgh Sleep Quality Index; PSQI-A = PSQI Addendum for PTSD; WUSEQ = Waterloo Unusual Sleep Experience Questionnaire; S50 = SLEEP-50; S50 RLS/PLMD = Restless Legs/Periodic Leg Movement Disorder; S50 Circadian Rhythm = Circadian Rhythm Sleep Disorder; S50 Impact = Impact of Sleep Complaints on Daily Functioning. Asterisks indicate significant coefficients *$p < .05$. **$p < .01$ ***$p < .001$.

PSQI Global Score. Regression analysis indicated that CSA was significantly related to PSQI Global score, b =1.96, $t(337) = 4.08$, $p < .001$, $R^2 = .05$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of PSQI Global score, $b = 6.37$, $t(336) = 6.47$, $p < .001$. CSA was still a significant predictor of PSQI Global score after accounting for recent trauma, $b = 1.28$, $t(336) = 2.76$, $p = .006$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

PSQI Subjective Sleep Quality. Regression analysis indicated that CSA was significantly related to PSQI Subjective Sleep Quality, $b = 0.37$, $t(337) = 3.74$, $p < .001$, $R^2 = .04$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of on PSQI Subjective Sleep Quality, $b = 0.93$, $t(336) = 4.47$, $p < .001$. CSA was still a significant predictor of PSQI Subjective Sleep Quality after accounting for recent trauma, $b = 0.27$, $t(336) = 2.74$, $p = .006$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

PSQI Sleep Latency. Regression analysis indicated that CSA was not significantly related to PSQI Sleep Latency, $b = 0.19$, $t(337) = 0.82$, $p = .41$, $R^2 = .002$. However, CSA was a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of PSQI Sleep Latency, $b = 1.97$, $t(336) = 3.97$, $p < .001$. CSA was not significantly related to PSQI Sleep Latency when controlling for recent trauma, $b = -0.02$, $t(336) = -0.07$, $p = .94$, $R^2 = .05$. As such, there was no support for a mediated effect, as described by Baron and Kenny (1986); however, as evident in Table 14, the indirect effect

through Recent Trauma was significant, suggesting that it is Recent Trauma that predicts sleep latency, and any effect of CSA comes through its impact on post childhood trauma.

PSQI Sleep Duration. Regression analysis indicated that CSA was significantly related to PSQI Sleep Duration, b = -0.47, $t(337)$ = -2.93, p = .004, R^2 = .03. CSA was also a significant predictor of recent trauma, b = 0.11, $t(337)$ = 4.23, p < .001, R^2 = .05, and recent trauma was a significant predictor of PSQI Sleep Duration, b = -1.90, $t(336)$ = -5.76, p < .001. CSA was no longer a significant predictor of PSQI Sleep Duration after accounting for recent trauma, b = -0.26, $t(336)$ = -1.69, p = .09. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with full mediation.

PSQI Sleep Efficiency. Regression analysis indicated that CSA was significantly related to PSQI Sleep Efficiency, b = -3.93, $t(318)$ = -2.55, p = .01, R^2 = .02. CSA was also a significant predictor of recent trauma, b = 0.10, $t(318)$ = 3.88, p < .001, R^2 = .05, and recent trauma was a significant predictor of PSQI Sleep Efficiency, b = -14.19, $t(317)$ = -4.40, p < .001. CSA was no longer a significant predictor of PSQI Sleep Efficiency after accounting for recent trauma, b = -2.49, $t(317)$ = -1.62, p = .11. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with full mediation.

PSQI Sleep Disturbances. Regression analysis indicated that CSA was significantly related to PSQI Sleep Disturbances, b = 2.93, $t(337)$ = 4.78, p < .001, R^2 = .06. CSA was also a significant predictor of recent trauma, b = 0.11, $t(337)$ = 4.23, p < .001, R^2 = .05, and recent trauma was a significant predictor of PSQI Sleep Disturbances, b = 7.13, $t(336)$ = 5.59, p < .001. CSA was still a significant predictor of PSQI Sleep Disturbances after accounting for recent trauma, b = 2.17, $t(336)$ = 3.60, p < .001. As evident in Table 14, the indirect effect was

significant. These results support the mediational hypothesis and are consistent with partial mediation.

PSQI Use of Sleep Medication. Regression analysis indicated that CSA was not significantly related to PSQI Use of Sleep Medication, $b = 0.25$, $t(337) = 1.90$, $p = .06$, $R^2 = .01$. CSA was a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of PSQI Use of Sleep Medication, $b = 0.83$, $t(336) = 2.92$, $p = .004$. CSA was not significantly related to PSQI Use of Sleep Medication when controlling for recent trauma, $b = 0.16$, $t(336) = 1.22$, $p = .22$, $R^2 = .04$. As such, there was no support for a mediated effect, as described by Baron and Kenny (1986); however, as evident in Table 14, the indirect effect through Recent Trauma was significant, suggesting that it is Recent Trauma that predicts use of sleep medication, and any effect of CSA comes through its impact on post childhood trauma.

PSQI Daytime Dysfunction. Regression analysis indicated that CSA was significantly related to PSQI Daytime Dysfunction, $b = 0.66$, $t(337) = 3.62$, $p < .001$, $R^2 = .04$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of PSQI Daytime Dysfunction, $b = 1.45$, $t(336) = 3.73$, $p < .001$. CSA was still a significant predictor of PSQI Daytime Dysfunction after accounting for recent trauma, $b = 0.51$, $t(336) = 2.75$, $p = .006$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

PSQI-A Global Score. Regression analysis indicated that CSA was significantly related to PSQI-A Global score, $b = 2.65$, $t(337) = 5.44$, $p < .001$, $R^2 = .08$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a

significant predictor of PSQI-A Global score, $b = 4.08$, $t(336) = 3.95$, $p < .001$. CSA was still a significant predictor of PSQI-A Global score after accounting for recent trauma, $b = 2.21$, $t(336) = 4.53$, $p < .001$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

WUSEQ Frequency. Regression analysis indicated that CSA was significantly related to WUSEQ sleep paralysis frequency, $b = 0.70$, $t(337) = 4.01$, $p < .001$, $R^2 = .05$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of WUSEQ sleep paralysis frequency, $b = 1.07$, $t(336) = 2.88$, $p = .004$. CSA was still a significant predictor of WUSEQ sleep paralysis frequency after accounting for recent trauma, $b = 0.58$, $t(336) = 3.30$, $p = .001$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Apnea. Regression analysis indicated that CSA demonstrated a significant direct effect of CSA SLEEP-50 Apnea scores, $b = 2.00$, $t(337) = 4.00$, $p < .001$, $R^2 = .05$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 Apnea subscale, $b = 4.71$, $t(336) = 4.47$, $p < .001$. CSA was still a significant predictor of SLEEP-50 Apnea scores after accounting for recent trauma, $b = 1.50$, $t(336) = 3.01$, $p = .003$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Insomnia. Regression analysis indicated that CSA demonstrated a significant direct effect of CSA SLEEP-50 Insomnia scores, $b = 2.78$, $t(337) = 3.57$, $p < .001$, $R^2 = .04$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and

recent trauma was a significant predictor of scores on the SLEEP-50 Insomnia subscale, b = 10.79, $t(336) = 6.81$, $p < .001$. CSA was still a significant predictor of SLEEP-50 Insomnia scores after accounting for recent trauma, $b = 1.63$, $t(336) = 2.17$, $p = .03$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Narcolepsy. Regression analysis indicated that CSA demonstrated a significant direct effect of CSA SLEEP-50 Narcolepsy scores, b =1.50, $t(337) = 4.34$, $p < .001$, $R^2 = .05$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 Narcolepsy subscale, $b = 1.87$, $t(336) = 2.50$, $p = .01$. CSA was still a significant predictor of SLEEP-50 Narcolepsy scores after accounting for recent trauma, $b = 1.31$, $t(336) = 3.70$, $p < .001$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 RLS/PLMD. Regression analysis indicated that CSA demonstrated a significant direct effect of CSA SLEEP-50 RLS/PLMD scores, b =1.32, $t(337) = 3.89$, $p < .001$, $R^2 = .04$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 RLS/PLMD subscale, $b = 2.88$, $t(336) = 4.02$, $p < .001$. CSA was still a significant predictor of SLEEP-50 RLS/PLMD scores after accounting for recent trauma, $b = 1.01$, $t(336) = 2.97$, $p = .003$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Circadian Rhythm Sleep Disorder. Regression analysis indicated that CSA was not significantly related to SLEEP-50 Circadian Rhythm Sleep Disorder, $b = 0.21$, $t(337) =$

0.83, $p = .41$, $R^2 = .002$. However, CSA was a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of SLEEP-50 Circadian Rhythm Sleep Disorder, $b = 1.31$, $t(336) = 2.39$, $p = .02$. CSA was not significantly related to SLEEP-50 Circadian Rhythm Sleep Disorder when controlling for recent trauma, $b = 0.07$, $t(336) = 0.28$, $p = .78$, $R^2 = .02$. As such, there was no support for a mediated effect, as described by Baron and Kenny (1986); however, as evident in Table 14, the indirect effect through Recent Trauma was significant, suggesting that it is Recent Trauma that predicts circadian rhythm sleep disorder, and any effect of CSA comes through its impact on post childhood trauma.

SLEEP-50 Nightmares. Regression analysis indicated that CSA was significantly related to SLEEP-50 Nightmares subscale scores, $b = 2.39$, $t(337) = 5.00$, $p < .001$, $R^2 = .07$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 Nightmares subscale, $b = 2.40$, $t(336) = 2.33$, $p = .02$. CSA was still a significant predictor of SLEEP-50 Nightmares scores after accounting for recent trauma, $b = 2.14$, $t(336) = 4.38$, $p < .001$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Nightmare Frequency item. Regression analysis indicated that CSA was significantly related to the SLEEP-50 Nightmares frequency item, $b = 0.55$, $t(337) = 5.03$, $p < .001$, $R^2 = .07$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of SLEEP-50 Nightmares frequency item scores, $b = 0.59$, $t(336) = 2.54$, $p = .01$. CSA was still a significant predictor of SLEEP-50 Nightmares frequency item scores after accounting for recent trauma, $b = 0.48$, $t(336)$

= 4.37, $p < .001$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Factors Influencing Sleep. Regression analysis indicated that CSA was significantly related to SLEEP-50 Factors Influencing Sleep subscale scores, $b = 1.14$, $t(337) = 2.67$, $p = .01$, $R^2 = .02$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 Factors Influencing Sleep subscale, $b = 1.91$, $t(336) = 2.07$, $p = .04$. CSA was still a significant predictor of SLEEP-50 Factors Influencing Sleep scores after accounting for recent trauma, $b = 0.93$, $t(336) = 2.15$, $p = .03$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

SLEEP-50 Impact of Sleep Complaints on Daily Functioning. Regression analysis indicated that CSA was significantly related to SLEEP-50 Impact of Sleep Complaints on Daily Functioning scores, $b = 2.60$, $t(337) = 3.83$, $p < .001$, $R^2 = .04$. CSA was also a significant predictor of recent trauma, $b = 0.11$, $t(337) = 4.23$, $p < .001$, $R^2 = .05$, and recent trauma was a significant predictor of scores on the SLEEP-50 Impact of Sleep Complaints on Daily Functioning subscale, $b = 6.67$, $t(336) = 4.66$, $p < .001$. CSA was still a significant predictor of SLEEP-50 Impact of Sleep Complaints on Daily Functioning scores after accounting for recent trauma, $b = 1.89$, $t(336) = 2.79$, $p = .006$. As evident in Table 14, the indirect effect was significant. These results support the mediational hypothesis and are consistent with partial mediation.

Discussion

Overview

The aim of the present research is to understand why adults with histories of CSA are more likely to have disrupted sleep. To answer this question, I examined two possibilities. First, sleep disturbances following CSA may be due to a generic effect of experiencing trauma. Second, because those with histories of CSA are more likely to experience subsequent adult abuse or trauma, adult sleep disturbance may be, at least in part, due to the effect of more recent trauma.

In terms of specific hypotheses, I first hypothesized that those who had experienced CSA would have poorer overall sleep when compared to their non-abused peers. Similarly, I predicted that those with a history of CSA would show different patterns of sleep dysfunction than those with a history of physical abuse. Secondarily, I hypothesized that those who had experienced childhood physical abuse would report greater disorders of arousal (i.e., sleepwalking, sleep terrors) than those who had been sexually abused, due to possible autonomic arousal as an adaptive response to threats to safety.

In terms of the mediation hypothesis, I hypothesized that CSA would be associated with more trauma in adulthood. Furthermore, I anticipated that this recent trauma would be correlated with greater sleep disruption and that it would play a mediating role in the relation between CSA and poor sleep quality. In general, the present research found support for some, but not all hypotheses. This will be outlined in detail below, with comparisons to previous research.

Adult Sleep Quality: Comparing Those Who Experienced CSA to Non-Abused Peers

I first hypothesized that I would replicate prior findings that those who have experienced CSA would have poorer overall sleep when compared to their non-abused peers. As was outlined in Tables 13 and 14, those who self-reported having experienced CSA, compared to those who did not experience abuse/trauma, scored significantly greater on all variables except for PSQI

Sleep Latency, PSQI Habitual Sleep Efficiency, PSQI Use of Sleep Medication, PSQI-A Episodes of Terror, WUSEQ Frequency, and the SLEEP-50 subscales for Circadian Rhythm Sleep Disorder, Sleepwalking, and Factors Influencing Sleep. So while it is true that those who experienced CSA, compared to their non-abused peers, reported poorer overall sleep as measured by the PSQI, it is also clear that some aspects of sleep were not affected, at least in this sample.

This suggests that, overall, those who experienced CSA may now, as adults, not have difficulty falling asleep, but instead have other difficulties, such as trouble maintaining sleep. Trouble maintaining sleep may manifest as nightmares or other sleep disturbances. For example, trouble sleeping because of waking up in the middle of the night or early morning and having to get up to use the restroom were the two most frequently reported sleep disturbances by those with CSA. Importantly, reported sleep disturbances may contribute to the sleep maintenance facet of insomnia. While the present study did not use clinical cutoff scores on SLEEP-50 measures, it is still clear that those with CSA report more insomnia-like symptoms and overall poor sleep quality. Furthermore, it is possible that this may drive daytime dysfunction and impact of sleep complaints on daily functioning.

Regarding symptomology (as opposed to specific sleep disorders), the present study's findings for this first hypothesis are partly in line with prior research, as it has been shown that those with CSA are more likely to have difficulty sleeping than non-abused peers. However, Agargun et al. (2003) found that those who experienced CSA had difficulty falling asleep when compared to those who did not experience CSA. The present study's findings are in contrast to those of Agargun et al., as those who self-reported having experienced CSA did not report significantly higher sleep latencies than those who did not experience abuse/trauma. Moreover, Chapman et al. (2011) found that participants who had been sexually abused as children were

more likely to have trouble falling or staying asleep than controls, but they did not discriminate between these two symptoms. The present study's findings are not completely in contrast to those of Chapman et al., as the present study did find that those who experienced CSA reported more trouble sleeping due to sleep disturbances. This particular finding is in agreement with other prior research; greater trouble sleeping (Agargun et al., 2003; Baiden et al., 2015) and sleep disturbances (Briere et al., 1988; Gal et al., 2011) been have been reported in those who experienced CSA when compared to those who have not. The present study found connections to daytime symptomology in PSQI daytime dysfunction and SLEEP-50 Impact of Sleep Complaints on Daily Functioning. This is in line with prior research by Chapman et al. (2011), who found that those who experienced CSA reported more feeling tired after sleeping than non-abused peers. Additionally, the present study found that those who experienced CSA had shorter sleep duration than non-abused peers. This too was found in prior research (Cuddy & Belicki, 1992).

The present study's findings for this first hypothesis are more mixed in agreement with prior research regarding specific sleep disorders. For insomnia, previous research by Briere and Runtz (1987) and Dent-Brown (1993) found no significant differences between CSA groups and no abuse groups; however, the present research found significant differences between groups, with those who experienced CSA exhibiting more insomnia symptomology. It is possible that a small sample size could explain Dent-Brown's findings. On the other hand, while Briere and Runtz (1987) used an adequately sized sample, they only used dichotomous absent/present responses to the presence of insomnia (unlike the present study, which takes a more detailed approach). As such, the authors conducted χ^2 tests and also used Yates continuity corrections "where appropriate" when comparing groups (p. 371). This conservative correction to the χ^2 test

has been criticized as overcorrecting such that it introduces more type II error (for review, see Hitchcock, 2009). However, the present study found significant differences between groups despite the use of Tukey's HSD, which is conservative with uneven sample sizes.

Pairwise comparisons revealed no support for sleep paralysis or sleep terrors to be greater in those who experienced CSA than in non-abused peers. This is in contrast to prior research that found significant group differences for sleep paralysis (Abrams et al., 2008; McNally & Clancy, 2005) and night terrors (Cuddy & Belicki, 1992)**.** Interestingly, as evident in Table 10, there was a significant correlation between CSA and sleep paralysis but not between CSA and sleep terrors. It is possible, then, for sleep paralysis, that the conservative nature of Kruskal-Wallis tests led to not finding a difference that may actually be present in the data.

It is also possible that results reflect differences in measurement. While the present study assessed frequency of sleep paralysis, McNally and Clancy (2005) assessed *presence* of sleep paralysis by use of a dichotomous absent/present response. Also, it is notable that the present study assessed sleep paralysis frequency by use of one question from the WUSEQ, with responses ranging from 1 "never" to 7 "several times a week". Abrams et al. (2008) also used an item from the WUSEQ to assess sleep paralysis frequency; however, the authors note that responses ranging from 1 "never" to 4 "more than five times". While it is probable that the version of the WUSEQ used in Abrams et al.'s study is asking for participants to give a weekly estimate, it was not directly stated. Also, it is noteworthy that these responses vary slightly, despite use of the same version of the WUSEQ cited by Abrams et al. Further, the authors split these responses into two bins, "never" and "frequently/always". It is possible, then, that these divergent results reflect differences in measurement and analysis.

Moreover, in the present study, night terror frequency was assessed by one item from the PSQI-A that asked patients to tell how many times a week during the past month they had trouble sleeping due to episodes of terror or screaming during sleep without fully awakening. However, Cuddy and Belicki (1992), after defining sleep terrors, asked participants to give an exact estimate of the number of sleep terrors experienced over the past year. It is possible, then, that these results reflect differences in measurement.

Additionally, the present study did agree with current literature in that nightmares were greater for those who experienced CSA, as was found by a number of prior studies (Cuddy & Belicki, 1992; Dedonato et al., 1996; Dent-Brown, 1993). Connections to greater nightmare symptomology were found on NDQ Nightmare Frequency and the SLEEP-50 Nightmares subscale.

The General Effect of Trauma on Adult Sleep: Comparing Those Who Experienced CSA to Those Who Experienced Other Forms of Abuse

My second hypothesis addressed whether the impact of CSA on adult sleep was due to a general effect of being traumatized, or whether it would reflect unique characteristics of experiencing sexual abuse. If just due to the general effect of trauma, people who have experienced CSA Only should differ from the No Trauma group but not from the PA Only group. In contrast, I had expected, because CSA and PA are arguably very different experiences, that those with a history of CSA would show different patterns of sleep dysfunction than those with a history of physical abuse. Noll et al. (2006) suggested that sleep may be particularly disturbed by sexual abuse as it often occurs in places where those who experience abuse must subsequently continue to sleep. Although in previous findings there was little evidence of a difference between those experiencing child sexual abuse from those experiencing child physical

abuse, I had anticipated that the improved methodology in the present study would allow for significant group differences to emerge. This, however, was not the case; the present study found no significant differences on pairwise group comparisons between CSA Only and PA Only on any measure of sleep. This is in line with prior research.

Akin to the present study, McCauley et al. (1997) used pure groups (i.e., where those who experienced CSA only, physical abuse only, or both CSA and physical abuse) and found no significant differences between CSA only and physical abuse only when asked a dichotomous question about problems sleeping. However, it is unclear exactly which construct used in this study maps most closely with "problems sleeping". Also, it is noteworthy that the authors asked participants about problems sleeping in the last six months whereas, in the present study, the PSQI and SLEEP-50 ask participants about problems in the last month. Thus, the two studies have measured slightly different outcomes.

Regarding nightmares and sleep terrors, the present study is in full agreement with prior research. Agargun et al. (2003) found sexually abused and physically abused groups to have similar nightmare frequency. Likewise, McCauley et al. (1997) found no significant differences between the CSA only and physical abuse only groups on occurrence of nightmares. Similarly, Cuddy and Belicki (1992) found no differences between the CSA and physical abuse groups on both nightmares and night terrors in the prior year.

Stemming from this hypothesis, I secondarily hypothesized that those who experienced PA Only would report greater disorders of arousal (i.e., sleepwalking, sleep terrors) than those who experienced CSA Only. As previously noted, the present research found no support for this hypothesis. It is possible then, that autonomic arousal as an adaptive response to threats to survival may be equal for sexual abuse and physical abuse groups during childhood. It would be

beneficial for future research to directly examine this supposition. However, in general it is apparent that the impact of child sexual abuse without violence is equal to the impact of experiencing violence, at least as indexed by sleep quality.

In sum, because measures of sleep symptomology and disorder between the CSA Only and PA Only groups do not differ, the present research supports that one reason that CSA disrupts adult sleep is because it is generally experienced as traumatic and childhood trauma has enduring impact on sleep. Comparisons made between the Both CSA/PA group to the CSA Only group as well as between the Both CSA/PA group to the PA Only group strengthen this claim. Prior research has shown that those who have experienced both sexual and physical abuse have greater symptomology in adulthood. For instance, Gelaye et al. (2015) found that pregnant women who had experienced both CSA and physical abuse had double the risk of non-abused peers to experience stress-related sleep disturbance and poor sleep quality. Stress-related sleep disturbance was significantly greater for those who had experienced both CSA and physical abuse when compared to those who had not experienced abuse; however, there were not significant differences between those who had experienced no abuse and either physical abuse only or sexual abuse only. By stress-related sleep disturbance, the authors meant sleep disturbance following stressors (e.g., getting into an argument, watching a scary movie, getting bad news, or public speaking). While the present study did not examine *stress-related* sleep disturbance, pairwise comparisons for sleep disturbances (e.g., not being able to sleep within 30 minutes, feeling too cold, feeling too hot, having pain) showed that all three abuse groups were significantly different from the No Trauma group. Overall sleep disturbances tended to be greatest in the Both CSA/PA group. In addition, Gelaye et al. (2015) found poor sleep quality was significantly different for the CSA and physical abuse group as well as for the physical

abuse only group, but not for the sexual abuse only group, when compared to the no abuse group. The present study also found poor sleep quality to be significantly different for the Both CSA only group and the PA Only group, when compared to the No Trauma group. However, unlike Gelaye et al. (2015), the present study also found the CSA Only group to be significantly different from the No Trauma group. Additionally, in the present study, neither the CSA Only group nor the PA Only group scored significantly different from the Both CSA/PA group on measures of sleep disturbances and poor sleep quality.

The present study found that the Both CSA/PA group was significantly different from the No Trauma group for all variables except Sleep Latency; on this variable, just the PA Only group was significantly different from the No Trauma group. Additionally, the majority of pairwise comparisons found the Both CSA/PA group to not significantly differ from the CSA Only group (19/22) and the PA Only group (15/22). The PA Only group was not significantly different from the Both CSA/PA group on SLEEP-50 Nightmares subscale. This is in agreement with previous research by Cuddy and Belicki (1992), which found no significant differences between those who had experienced CSA and those who had experienced CSA and physical abuse on measures of nightmares. However, on measures of sleepwalking, RLS/PLMD, and narcolepsy in the present study, those who had experienced PA Only but not those who had experienced CSA Only were found to have significantly lower scores from those who had experienced Both CSA/PA. In each case, those who had experienced Both CSA/PA had the highest mean scores, followed by those who had experienced CSA Only, then those who had experienced PA Only. While it is possible that these three emerge in this pattern by chance, it does underscore again that CSA has as great a disruptive impact on sleep as physical abuse. It is also noteworthy that all three of these disorders are characterized by frequent nocturnal awakenings that fragment sleep

(ICSD-3). Thus, it is possible that a third variable (e.g., autonomic arousal) may explain this pattern. Future research could investigate such connections.

On measures of disruptive nocturnal behaviours, episodes of terror during sleep, and sleep paralysis, Both CSA/PA had significantly more negative symptomology than CSA Only and PA Only. Interestingly, each of these variables includes or represents a parasomnia; however, these are not the only variables examining parasomnias in the study. For example, nightmares, the Both CSA/PA group was not significantly different from either the CSA Only group or the PA Only group. Thus, it is possible that for some parasomnias, additive effects of trauma may play a larger role than for others. Should future research want to examine these connections, one possible connection between these three variables is that sleep terrors (a disruptive nocturnal behaviour) and sleep paralysis can be brought on by inadequate or irregular sleep habits. Thus, future research could investigate sleep hygiene as a potential mediator of the relation between Both CSA/PA and parasomnias.

The Role of Post-Childhood Trauma in the Relation between CSA and Adult Sleep Quality

The present study examined the role of post-childhood trauma as a possible mediator of the relation between CSA and adult sleep. Based on prior findings, I first hypothesized that CSA would be associated with more trauma in adulthood. Secondly, I also hypothesized that this post-childhood trauma would be correlated with greater sleep disruption. And lastly, I hypothesized that this more recent trauma would act as a mediator of the relation between CSA and greater sleep disruption. To understand if recent trauma acted as a mediator in the present study, I examined my findings to see if they met Baron and Kenny's (1986) conditions for a variable to act as a mediator. Specifically, the authors laid out that the independent variable must predict the dependent variable, the independent variable (CSA, in this case) must predict the mediating

variable (Recent Trauma), the mediating variable must predict the dependent variable (the sleep variables) while controlling for the IV, and the independent variable must either no longer predict or be lessened in predicting the dependent variable when controlling for the mediating variable. In the case that the independent variable is no longer a significant predictor of the dependent variable, the authors described this as full mediation. In the case that the independent variable is lessened in predicting the dependent variable, this was described as partial mediation. While the authors used the Sobel test to test the significance of the indirect effect, the present study used bootstrapping with 5000 replications, as bootstrapping is widely regarded as a superior method to test the significance of indirect effects. Shrout and Bolger (2002) described the bootstrapped effect as significant when the number zero is not between the confidence interval lower and upper limits.

The present study found that CSA was significantly associated with more subsequent trauma in adulthood. This fits with the bulk of prior research. For example, Fergusson et al. (1997), in a study of adolescents who experienced CSA, found that CSA involving contact was related to subsequent rape/attempted rape or sexual assault between the ages of 16 and 18. Likewise, Barnes et al. (2009), in a study of women who experienced CSA, found that CSA was related to increased odds of subsequent sexual assault and physical abuse. Conversely, Briere and Runtz (1987) found that sexual abuse prior to the age of 15 was related to higher rates of domestic violence but not rape in adulthood. As previously noted, it is possible that Briere and Runtz' usage of Yates continuity corrections when comparing groups could have introduced more type II error. This could account for discrepant findings. Additionally, it is possible that the author's narrow focus on rape and not broader sexual assault could also explain discrepant findings.

Additionally, the present study found that post-childhood trauma was related to sleep-related outcomes. Specifically, regression analyses controlling for CSA indicated that post-childhood trauma was a significant predictor of poor sleep quality, subjective sleep quality, sleep latency, sleep duration, sleep efficiency, overall sleep disturbances, use of sleep medication, daytime dysfunction, disruptive nocturnal behaviours, sleep paralysis frequency, sleep apnea, insomnia, narcolepsy, restless legs/periodic limb movement disorder (RLS/PLMD), circadian rhythm sleep disorder, nightmares, nightmare frequency (one item from the nightmare subscale), as measured by the SLEEP-50, factors influencing sleep, and impact of sleep complaints on daily functioning. There was overwhelming support for post-childhood trauma predicting sleep-related outcomes, in step with prior research.

We know that sleep disturbance is well documented following traumatizing events (Ellis et al., 1998; Kato et al., 1996; Mellman et al., 1995); yet, little research has examined the relations among CSA, recent trauma, and sleep. Noll et al. (2006), in a study of adolescent and young-adult women, found sleep disruption to be a significant predictor of sexual and physical revictimization. The present research also found post-childhood trauma and negative sleep outcomes to be related. As can be seen in Table 14, a significant effect of recent trauma was found for every variable used in mediation analyses. Interestingly, CSA did not – alone or after controlling for post-childhood trauma – predict sleep latency, use of sleep medication, or circadian rhythm sleep disorder. More research is needed to understand the indirect effects through recent trauma uncovered in these differential outcomes.

The present study's findings for recent trauma were consistent with full mediation for sleep duration and sleep efficiency, and partial mediation for overall poor sleep quality, subjective sleep quality, sleep disturbances, daytime dysfunction, disruptive nocturnal

behaviours, sleep paralysis frequency, sleep apnea, insomnia, narcolepsy, RLS/PLMD, nightmares, nightmare frequency, factors influencing sleep, and impact of sleep complaints on daily functioning. These findings add to our understanding of the mediating role that recent trauma plays, as little research has considered this role.

While two studies (Cecil et al., 2015; Kajeepeta et al., 2015) have proposed on theoretical grounds that recent trauma may act as a mediator, only one study (Gelaye et al., 2015) has empirically examined this relation. Gelaye et al. (2015) considered recent abuse, defined as physical or sexual violence at the hands of an intimate partner in the twelve months prior to the pregnancy being studied, as a potential mediator of the relations between any childhood abuse (i.e., physical abuse and/or sexual abuse) and two sleep outcomes, stress-related sleep disturbance and overall poor sleep quality. The authors found that partner violence partially mediated the relations, although the effects were small. Therefore, while there were considerable differences between the Gelaye et al. study and this study, the findings are consistent.

The Impact of CSA on Sleep

A noteworthy issue I encountered in the present study was that some of the data did not meet the requirements for parametric testing. When data fails to meet assumptions of homogeneity or normality, as was the case in this study, or when median scores are more informative than mean scores, non-parametric tests may explain the data better than parametric tests. Thus, I conducted non-parametric Kruskal-Wallis tests for variables that violated assumptions in addition to MANOVA followed by Tukey's HSD post-hoc comparisons for variables that met assumptions. While few studies have indirectly indicated violations of assumptions by performing non-parametric tests (e.g., Agargun et al., 2002; Agargun et al., 2003), many have not addressed whether their data meet the assumptions that underlie analyses –

nor have they transformed the variables examined to meet these assumptions. This is one strength of the present research. Future research would benefit our understanding of the relations between CSA and adult sleep by being more mindful of the relevant statistical assumptions. Additionally, a review of the current literature with a focus on statistical analysis could help make clear if violations of assumptions required for parametric testing extend beyond the present study and if current practices appropriately match the data.

How to Operationally Define Child Sexual Abuse?

As noted in the Introduction, there is disagreement in the current literature as to what constitutes sexual abuse. A number of studies have required genital contact to have had occurred (e.g., Briere & Runtz, 1987; Trickett et al., 2001; Wolfe et al., 1989). Arguably it is the subjective reaction that would drive sleep disturbance, not the specific event; therefore, the present study used a broader, more subjective definition, supplemented with specific questions about abuse characteristics. Participants were given a range of possible behaviours ranging from non-contact to genital contact and asked to indicate which behaviours they experienced. Results showed that several of the experiences that people found abusive did not involve genital contact: 41% of participants indicated that for them CSA was characterized by an invitation or request to do something sexual, 34% by kissing or hugging in a sexual way, 52% by a person showing his/her sex organs to them, and 26% by them showing their sex organs to another person. Therefore, future research would benefit from inclusion of abuse experiences that fall outside the conservative genital contact-only definition. The strategy adopted in the present study is ideal: participants were allowed to self-identify as having experienced sexual abuse without any limiting conditions; however, I then solicited specific information about the actual event.

Another issue that arose from my results was that of uncertainty of abuse. In the present study, participants were asked to complete two measures of childhood abuse/trauma, one (i.e., CTES) with binary yes/no choices and the other (i.e., CEQ) with yes, no, and two options reflecting uncertainty of experience. Three items on both measures were similar in content (i.e., sexual trauma on CTES and sexual abuse on CEQ, violence on CTES and physical abuse on CEQ, and illness or injury on CTES and medical trauma on CEQ). This provided the opportunity to compare participants' responses through crosstabulation. It became apparent from these results that some people are uncertain about whether they have been abused, but if not given the opportunity to indicate they are uncertain (as is given in the CEQ), they will go ahead and answer the question as if they are certain. Crosstabulation revealed that some participants indicated on the CTES that abuse had occurred even when on the CEQ they indicated that they doubted that it had. Therefore, the operational definition for abuse/trauma was set such that participants needed to have answered "Yes" to the relevant CEQ and CTES items; as a result, 38 participants were subsequently dropped from analyses of CSA and 51 from analyses of childhood physical abuse.

Interestingly, those who responded "I don't know, but I doubt it" on the CEQ overwhelmingly chose "No" instead of "Yes" on the CTES for all three cross-tabulated items; however, a small number chose "Yes". Those who indicated "I don't know, but I suspect yes" to physical abuse and medical trauma on the CEQ responded more equally, yet leaning toward "Yes" regarding violence and illness or injury on the CTES. However, those who indicated "I don't know, but I suspect yes" to sexual abuse on the CEQ more frequently selected "No" than "Yes" to sexual trauma on the CTES.

First, this suggests that giving participants responses beyond simply yes and no to choose from may better reflect their understanding of childhood experiences. Second, it raises the question as to whether differences exist in whether participants lean toward yes or no across abuse/trauma types in participants who indicated uncertainty. Third, because most prior research did not ask participants about uncertainty, certainty of experience arises as a relevant factor for future research, as it is unclear if prior research has under- or over-estimated the impact of childhood abuse/trauma. Use of a questionnaire like the CEQ is an easy way for future research to allow participants to indicate uncertainty.

There are a number of reasons that participants could be unsure of whether abuse had occurred. It is possible that participants may have been too young to recall these events or may even be relying on the uncertainty of adults who relayed events to them. Participants may also have been drugged or unconscious at the time of abuse and, thus, may be unable to recall its occurrence. Additionally, it is possible that those who were abused as children simply may not recall the events, as it has been established that people can have troubles recalling traumatic events (DSM-5). It is also possible that participants were uncertain of whether the behaviour they experienced constitutes abuse. Future research could examine characteristics of uncertainty of abuse and whether different patterns of sleep disturbance symptomatology emerge for those who are uncertain about childhood abuse.

Another disparity in the current literature involves the question of what constitutes childhood. Many studies regard children as those under the age of consent; however, age of consent often varies by locale (Hasinoff, 2015) and over time (Dauda, 2010). Given the variability and lack of consensus in prior research, the present research employed the term "childhood", allowing participants to determine if abuse occurred at a point during which they

identified as a child. However, similar to the strategy adopted with operationally defining abuse, I also asked participants to provide the age or ages that abuse occurred. I coded earliest abuse/trauma for each participant. Across abuse and trauma categories on the CTES, the oldest age reported ranged from age 12 (for illness or injury) to as late as 19 (death of a close friend or family member). This suggests that there is great variability in what those who have experienced abuse/trauma at early ages consider childhood to be; thus, future research may want to take this into consideration. However, as CTES ratings indicated that the oldest age reported for childhood sexual trauma was 18 and for physical violence was age 17, the results for this study should not deviate significantly from prior research that defined childhood as occurring before the age of 18.

Strengths and Limitations of Current Research

The present study was designed to address a number of problems with the research to date as outlined by Steine et al. (2012). As Steine et al. (2012) pointed out, many studies do not include comparison groups (e.g., non-abused or physically abused samples). The present study gathered information on other forms of abuse/trauma and drew comparisons to non-abuse, childhood physical abuse, and the combination of CSA and physical abuse. Such comparisons help to determine whether the impact of CSA on adult sleep is unique to sexual abuse or a more general function of trauma.

Additionally, Steine et al. commented that many studies have limited generalizability because they used clinic-based samples of sexually abused people seeking treatment. In addition, most studies have inappropriately small sample sizes. To address these concerns, the present research used a community-based sample that is larger than typically found in prior studies. Even after reducing the abuse groups to individuals who said yes to abuse on two questionnaires,

group sizes remained adequate. Because Steine and colleagues noted that a need exists for studies to investigate mechanisms of the relation between CSA and sleep problems in adulthood, the present study also examined and established recent trauma as a mediator of the relation between CSA and adult sleep dysfunction.

Furthermore, Steine et al. (2012) cited considerable variation in methods of sleep assessment across studies and a tendency to rely on one-off questionnaires lacking established reliability or validity. To increase comparability across studies, the present study aimed to make improvements to measurement. First, while a large number of prior studies have focused on general sleep dysfunction, the present study measured general poor sleep quality and an array of specific sleep symptoms and disorders (e.g., nightmares, insomnia, narcolepsy). Second, the present study used several sleep questionnaires with sound psychometric properties.

Moreover, the use of more broad and subjective definitions of childhood and of CSA in the present study could be viewed as limitations; however, as it may be one's reaction to trauma and not the trauma itself that drives symptomology, I think a more subjective definition may better reflect abusive experiences. In addition, the present study employed two questionnaires (i.e., the CTES and the CTEQ) to ask participants about adverse childhood experiences. In doing so, the present study was able to crosstabulate questionnaire responses. This proved to be important, as it revealed that a sizeable minority of participants that responded as uncertain on the CEQ answered either "Yes" or "No" on the CTES, instead of leaving the item unanswered. This allowed me to only include participants who indicated certainty of abuse on the CEQ, and who answered in the same direction on both questionnaires, in subsequent analyses. This is another strength of the present study. Furthermore, I feel that the conservative manner in which comparison groups were created by combining CTES and CEQ responses helped to reduce

variability and balance concerns about the use of broad definitions. This, however, could have invited underestimation of CSA.

The present study is limited by its retrospective, cross-sectional nature. Additionally, the present study did not control for other factors (e.g., psychiatric conditions, gender) that could also impair sleep. As such, future research would benefit from use of longitudinal or follow-up designs and accounting for known covariates.

Summary and Conclusions

The present study was conducted to understand why adults with histories of CSA have poorer sleep than their non-abused counterparts. Specifically, I examined two possibilities. First, the present study explored whether sleep disturbances are due to a generic effect of trauma or if they are unique to CSA. If just due to the general effect of trauma, adults who had experienced CSA Only would have differed from the No Trauma group but not from the PA Only group. As hypothesized, those who experienced CSA Only were found to have poorer overall sleep than non-abused peers; however, those who had experienced CSA Only were not significantly different from those who had experienced PA Only or Both CSA/PA on any sleep outcome, excepting disruptive nocturnal behaviours, sleep terrors, and sleep paralysis frequency. Further, those who had experienced PA Only did not report greater disorders of arousal (e.g., sleepwalking and sleep terrors) than those who experienced CSA Only. Collectively, these results suggest that CSA disrupts sleep for the same reason that childhood physical abuse disrupts sleep: both are traumatic experiences and it is well established that trauma impacts sleep.

Second, the present study also examined trauma experienced after childhood as a possible mediator of the relation between CSA and adult sleep quality, as those with histories of CSA are more likely to experience subsequent adult abuse/trauma. The present study found, for every sleep outcome used in mediation analyses, a significant effect of CSA on post-childhood trauma and a

significant effect of post-childhood trauma. Additionally, full or partial mediation was indicated for nearly all sleep outcomes tested. In line with limited prior research, these findings suggest that, CSA when coupled with greater retraumatization (i.e., experience of post-childhood trauma) is predictive of generic poor sleep quality and a range of specific sleep disorders. Importantly, however, full mediation was indicated for only two sleep outcomes: sleep duration and sleep efficiency. Results for 14 other sleep outcomes were consistent with partial mediation. As such, it is clear that post-childhood trauma is not the full story in accounting for adult sleep disruption and disorder. This underscores the importance for future research to explore other mechanisms to better understand how and why CSA has an enduring impact on sleep. Additionally, as CSA did not – alone or after controlling for post-childhood trauma – predict sleep latency, use of sleep medication, or circadian rhythm sleep disorder, more research is needed to better understand the indirect effects of CSA through recent trauma.

The present study also offers insight on issues that I did not set out to examine, but that have arisen as important. One such issue is that of certainty of abuse. The present study provided participants with two opportunities to indicate whether they had experienced abuse/trauma in childhood. One questionnaire (i.e., CTES) allowed for a binary "Yes" or "No" choice, whereas the other (i.e., CEQ) expanded to include two options that reflected uncertainty: "I don't know, but I doubt it" and "I don't know, but I suspect yes". Crosstabulation of the CTES and CEQ revealed that a large number of participants who responded as uncertain on the CEQ answered as either "Yes" or "No" on the CTES, which resulted in 38 participants being dropped from analyses of CSA and 51 from analyses of childhood physical abuse. These findings call into question whether many past studies have under- or over-estimated the impact of childhood abuse/trauma. As most prior research did not ask participants about uncertainty, certainty of experience arises as a relevant factor for future research, which could examine characteristics of

uncertainty of abuse and whether different patterns of sleep disturbance symptomatology emerge for those who are uncertain about childhood abuse. Use of a questionnaire like the CEQ is an easy way for future research to allow participants to indicate uncertainty.

Another issue that surfaced in the present study as important was that of problems with the testing of assumptions (e.g., normality, skew/kurtosis). Five variables didn't make it into MANOVA due to violation of assumptions. Of the 17 variables that were entered into MANOVA, 8 failed the assumption of equal variances over two tests with deletion of offending variables to increase statistical power. Understandably, such widespread violation of assumptions raises questions about previous research, given that few researchers have indirectly commented on violations of assumptions by performing non-parametric tests and a large number have neither addressed whether their data meet the assumptions that underlie analyses nor reduced the variables examined to meet these assumptions. Thus, there is a need for review to examine research practices in the literature.

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Appendix A

Demographic Questionnaire

Thank you for agreeing to participate in this research. Scientific journals require researchers to provide basic descriptions so that other scientists can judge how well the results will apply to others. We would, appreciate receiving the following information about you.

If you do not wish to answer a question that has a blank, please type in "Prefer Not To Say".

What is your age (in years)?

What is your sex?

What country were you born in?

To which ethnic, cultural, racial group(s) do you belong? Please check all that apply.

- ☐ White/Caucasian
- ☐ Black, African American, or Negro
- ☐ American Indian or Alaska Native
- ☐ Asian Indian; Chinese; Filipino; Japanese; Korean; Vietnamese; Other Asian
- ☐ Hispanic; Latino, or Spanish Origin: Mexican, Mexican American, Chicano; Puerto Rican; Cuban; Another Hispanic, Latino, or Spanish Origin
- ☐ Native Hawaiian; Guamanian or Chamorro; Samoan; Other Pacific Islander
- ☐ Some Other Race
- ☐ Prefer Not to Say

What is your relationship status?

- ○ Single
- ○ Engaged
- ○ Married/Common-Law/Living with partner
- ○ Divorced/Separated
- ○ Widowed
- ○ I have a partner (but we do not live together)
- ○ Prefer Not to Say

What best describes your current living situation?

- ○ I live on my own.
- ○ I live with my significant other (i.e., spouse, common-law partner).
- ○ I live with my significant other as well as others. If so, how many other people not including your significant other?
- ○ I do not live with my significant other but I live with one (or more) of my children.
- ○ I do not live with my significant other but I live with others who are not my children. If so, how many people?
- ○ I live in a retirement home.
- ○ I live in an assisted living residence.
- ○ Prefer Not to Say

Do you have any children?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How many?

Do you take care of someone throughout the night (e.g., child, partner, parent)?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

Do you have a bed partner?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

What is your highest education level achieved?

- Some high school or pre high school
- Finished high school
- Some college, university, or apprenticeship program
- Completed a college/apprenticeship diploma (e.g., electrician) and/or technical diploma (e.g., graphic design, hair dressing)
- Completed a university undergraduate degree
- Completed a professional degree (e.g., masters, PhD, medical doctor, lawyer)
- Prefer Not to Say

What is your employment status?

- Full-time
- Part-time
- Unemployed
- Retired
- Other
- Prefer Not to Say

Is English your first language?

- Yes
- No
- Prefer Not to Say

Appendix B

Childhood Experiences Questionnaire

Please indicate if you had any of the following experiences as a child.

If you do not wish to answer a question, please select "Prefer Not to Say".

Physical abuse

- ○ No
- ○ I don't know, but I doubt it.
- ○ I don't know, but I have a suspicion that maybe yes.
- ○ Yes
- ○ Prefer Not to Say

Sexual abuse

- ○ No
- ○ I don't know, but I doubt it.
- ○ I don't know, but I have a suspicion that maybe yes.
- ○ Yes
- ○ Prefer Not to Say

Psychological / Emotional abuse

- ○ No
- ○ I don't know, but I doubt it.
- ○ I don't know, but I have a suspicion that maybe yes.
- ○ Yes
- ○ Prefer Not to Say

Emotional or Physical neglect

- No
- I don't know, but I doubt it.
- I don't know, but I have a suspicion that maybe yes.
- Yes
- Prefer Not to Say

Medical Trauma

- No
- I don't know, but I doubt it.
- I don't know, but I have a suspicion that maybe yes.
- Yes
- Prefer Not to Say

Other Trauma

- No
- I don't know, but I doubt it.
- I don't know, but I have a suspicion that maybe yes.
- Yes
- Prefer Not to Say

Appendix C

Childhood Traumatic Events Scale

For the following questions, answer each item that is relevant. Be as honest as you can. Each question refers to any event that you may have experienced as a child.

If you do not wish to answer a question that has a blank, please type in "Prefer Not to Say".

As a child, did you experience a death of a very close friend or family member?

- Yes
- No
- Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

As a child, was there a major upheaval between your parents (such as divorce, separation)?

- Yes
- No
- Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

As a child, did you have a traumatic sexual experience (raped, molested, etc.)?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

As a child, were you the victim of violence (child abuse, mugged or assaulted -- other than sexual)?

- Yes
- No
- Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

As a child, were you extremely ill or injured?

- Yes
- No
- Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

As a child, did you experience any other major upheaval that you think may have shaped your life or personality significantly?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How old were you? If you have experienced this more than once, please describe as best as possible when these events occurred (for example, 3 times between the ages of 7 and 9).

What was the event?

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

Appendix D

Recent Traumatic Events Scale

The following questions repeat the ones you have just completed, but now please indicate those you have experienced **after childhood**.

If you do not wish to answer a question, please select Prefer Not to Say or, if that question has a blank, please type in "Prefer Not to Say".

After childhood, did you experience a death of a very close friend or family member?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, was there a major upheaval between you and your spouse or partner (such as divorce, separation)?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, did you have a traumatic sexual experience (raped, molested, etc.)?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, were you the victim of violence (other than sexual)?

- Yes
- No
- Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, were you extremely ill or injured?

- Yes
- No
- Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, has there been a major change in the kind of work you do (e.g., a new job, promotion, demotion, lateral transfer)?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

After childhood, did you experience any other major upheaval that you think may have shaped your life or personality significantly?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

How long ago did this happen? If it has happened more than once, please indicate as best as possible how many times and tell us how long ago the most traumatic happened.

How traumatic was this? If it happened more than once, please rate the most traumatic time.

1 Not at all traumatic	2	3	4 Somewhat traumatic	5	6	7 Extremely traumatic	Prefer Not to Say
○	○	○	○	○	○	○	○

How much did you confide in others about this traumatic experience at the time?
If it happened more than once, please answer how much you confided following the most traumatic time.

1 Not at all	2	3	4	5	6	7 A great deal	Prefer Not to Say
○	○	○	○	○	○	○	○

Appendix E

Unwanted Childhood Sexual Experiences Questionnaire

It is now generally realized that most people have sexual experiences as children and while growing up. By "sexual" it is meant any behaviour or event that might seem "sexual" to you. Please try to remember the **unwanted**, that is, sexual experiences that were forced on you or done against you by another person, while growing up. Indicate if you had any of the following experiences as a child. If you would rather not answer, please select "Prefer Not to Say" at the end of the list.

- ☐ An invitation or request to do something sexual
- ☐ Kissing or hugging in a sexual way.
- ☐ A person showing his/her sex organs to you.
- ☐ You showing your sex organs to a person.
- ☐ A person fondling you in a sexual way.
- ☐ You fondling a person in a sexual way.
- ☐ A person touching your sex organs.
- ☐ You touching a person's sex organs.
- ☐ A person orally touching your sex organs.
- ☐ You orally touching a person's sex organs.
- ☐ Intercourse, but without attempting penetration of the vagina.
- ☐ Vaginal intercourse (penile-vaginal penetration).
- ☐ Anal intercourse (penile-anal penetration).
- ☐ None of the Above
- ☐ Prefer Not to Say

Upon item selection, this popup would prompt participants for more information:

How old were you and the other person(s) involved when this happened? If it happened more than once or repeatedly over a period of time, please describe as best as possible how old you were and how old the other person(s) were.

Appendix F

Pittsburgh Sleep Quality Index (PSQI)

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. **Please answer all questions.**

During the past month, when have you usually gone to bed?

During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

During the past month, when have you usually gotten up in the morning?

During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week	Prefer Not to Say
...cannot get to sleep within 30 minutes	○	○	○	○	○
...wake up in the middle of the night or early morning	○	○	○	○	○
...have to get up to use the bathroom	○	○	○	○	○
...cannot breathe comfortably	○	○	○	○	○
...cough or snore loudly	○	○	○	○	○
...feel too cold	○	○	○	○	○
...feel too hot	○	○	○	○	○
...had bad dreams	○	○	○	○	○
...have pain	○	○	○	○	○

During the past month, have you had trouble sleeping for other reasons?

- ○ Yes
- ○ No
- ○ Prefer Not to Say

Appendix G

Pittsburgh Sleep Quality Index (PSQI)

Form Administration Instructions, References, and Scoring

Form Administration Instructions

The range of values for questions 5 through 10 are all 0 to 3.

Questions 1 through 9 are not allowed to be missing except as noted below. If these questions are missing then any scores calculated using missing questions are also missing. Thus it is important to make sure that all questions 1 through 9 have been answered.

In the event that a range is given for an answer (for example, '30 to 60' is written as the answer to Q2, minutes to fall asleep), split the difference and enter 45.

Reference

Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ: The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research* 28:193-213, 1989.

Scores – reportable in publications

On May 20, 2005, on the instruction of Dr. Daniel J. Buysse, the scoring of the PSQI was changed to set the score for Q5J to 0 if either the comment or the value was missing. This may reduce the DISTB score by 1 point and the PSQI Total Score by 1 point.

PSQIDURAT — **DURATION OF SLEEP**

IF Q4 $\geq$ 7, THEN set value to 0
IF Q4 < 7 and $\geq$ 6, THEN set value to 1
IF Q4 < 6 and $\geq$ 5, THEN set value to 2
IF Q4 < 5, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIDISTB — **SLEEP DISTURBANCE**

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) = 0, THEN set value to 0

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) $\geq$ 1 and $\leq$ 9, THEN set value to 1

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) > 9 and $\leq$ 18, THEN set value to 2

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) > 18, THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQILATEN — **SLEEP LATENCY**

First, recode Q2 into Q2new thusly:
IF Q2 $\geq$ 0 and $\leq$ 15, THEN set value of Q2new to 0
IF Q2 > 15 and $\leq$ 30, THEN set value of Q2new to 1
IF Q2 > 30 and $\leq$ 60, THEN set value of Q2new to 2
IF Q2 > 60, THEN set value of Q2new to 3

Next
IF Q5a + Q2new = 0, THEN set value to 0
IF Q5a + Q2new ≥ 1 and ≤ 2, THEN set value to 1
IF Q5a + Q2new ≥ 3 and ≤ 4, THEN set value to 2
IF Q5a + Q2new ≥ 5 and ≤ 6, THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIDAYDYS **DAY DYSFUNCTION DUE TO SLEEPINESS**
IF Q8 + Q9 = 0, THEN set value to 0
IF Q8 + Q9 ≥ 1 and ≤ 2, THEN set value to 1
IF Q8 + Q9 ≥ 3 and ≤ 4, THEN set value to 2
IF Q8 + Q9 ≥ 5 and ≤ 6, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIHSE **SLEEP EFFICIENCY**
Diffsec = Difference in seconds between day and time of day Q1 and day Q3
Diffhour = Absolute value of diffsec / 3600
newtib =IF diffhour > 24, then newtib = diffhour – 24
IF diffhour ≤ 24, THEN newtib = diffhour
(NOTE, THE ABOVE JUST CALCULATES THE HOURS BETWEEN GNT (Q1) AND GMT (Q3))
tmphse = (Q4 / newtib) * 100

IF tmphse ≥ 85, THEN set value to 0
IF tmphse < 85 and ≥ 75, THEN set value to 1
IF tmphse < 75 and ≥ 65, THEN set value to 2
IF tmphse < 65, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQISLPQUAL **OVERALL SLEEP QUALITY**
Q6
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIMEDS **NEED MEDS TO SLEEP**
Q7
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQI **TOTAL**
DURAT + DISTB + LATEN + DAYDYS + HSE + SLPQUAL + MEDS
Minimum Score = 0 (better); Maximum Score = 21 (worse)
Interpretation: TOTAL ≤ 5 associated with good sleep quality
TOTAL > 5 associated with poor sleep quality

Appendix H

Pittsburgh Sleep Quality Index Addendum for PTSD (PSQI-A)

INSTRUCTIONS: Please answer the following additional questions regarding your sleep in the past month. Include any observations from your bed partner / roommate.

During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week	Prefer Not to Say
Feel hot flashes:	○	○	○	○	○
Feel general nervousness:	○	○	○	○	○
Had memories or nightmares of a traumatic experience:	○	○	○	○	○
Had severe anxiety or panic, not related to traumatic memories:	○	○	○	○	○
Had bad dreams, not related to traumatic memories:	○	○	○	○	○
Had episodes of terror or screaming during sleep without fully awakening:	○	○	○	○	○
Had episodes of "acting out" your dreams, such as kicking, punching, running, or screaming:	○	○	○	○	○

Appendix I

SLEEP-50 Questionnaire (SLEEP-50)

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I am told that I snore	○	○	○	○	○
I sweat during the night	○	○	○	○	○
I am told that I hold my breath when sleeping	○	○	○	○	○
I am told that I wake up gasping for air	○	○	○	○	○
I wake up with a dry mouth	○	○	○	○	○
I wake up during the night while coughing / being short of breath	○	○	○	○	○
I wake up with a sour taste in my mouth	○	○	○	○	○
I wake up with a headache	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I have difficulty in falling asleep	○	○	○	○	○
Thoughts go through my head and keep me awake	○	○	○	○	○
I worry and find it hard to relax	○	○	○	○	○
I wake up during the night	○	○	○	○	○
After waking up during the night, I fall asleep slowly	○	○	○	○	○
I wake up early and cannot get back to sleep	○	○	○	○	○
I sleep lightly	○	○	○	○	○
I sleep too little	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I see dreamlike images when falling asleep or waking up	○	○	○	○	○
I sometimes fall asleep on a social occasion	○	○	○	○	○
I have sleep attacks during the day	○	○	○	○	○
With intense emotions, my muscles sometimes collapse during the day	○	○	○	○	○
I sometimes cannot move when falling asleep or waking up	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I am told that I kick my legs when I sleep	○	○	○	○	○
I have cramps or pain in my legs during the night	○	○	○	○	○
I feel little shocks in my legs during the night	○	○	○	○	○
I cannot keep my legs at rest when falling asleep	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I would rather go to bed at a different time	○	○	○	○	○
I go to bed at very different times (more than 2 hours difference)	○	○	○	○	○
I do shift work	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I sometimes walk when I am sleeping	○	○	○	○	○
I sometimes wake up in a different place than where I fell asleep	○	○	○	○	○
I sometimes find evidence of having performed an action during the night I do not remember	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I have frightening dreams	○	○	○	○	○
I wake up from these dreams	○	○	○	○	○
I remember the content of these dreams	○	○	○	○	○
I can orientate quickly after these dreams	○	○	○	○	○
I have physical symptoms during or after these dreams (e.g. movements, sweating, heart palpitations, shortness of breath)	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
It is too light in my bedroom during the night	○	○	○	○	○
It is too noisy in my bedroom during the night	○	○	○	○	○
I drink alcoholic beverages during the night	○	○	○	○	○
I smoke during the evening	○	○	○	○	○
I use other substances during the evening (e.g. sleep or other medication)	○	○	○	○	○
I feel sad	○	○	○	○	○
I have no pleasure or interest in daily occupations	○	○	○	○	○

Please read every statement below and indicate to what extent it applied to you during the last four weeks.

	not at all	a little	rather much	very much	prefer not to say
I feel tired at getting up	○	○	○	○	○
I feel sleepy during the day and struggle to remain alert	○	○	○	○	○
I would like to have more energy during the day	○	○	○	○	○
I am told that I am easily irritated	○	○	○	○	○
I have difficulty in concentrating at work or school	○	○	○	○	○
I worry whether I sleep enough	○	○	○	○	○
Generally, I sleep badly	○	○	○	○	○

Triangles have four sides. (hint: select "not at all").

not at all	a little	rather much	very much	prefer not to say
○	○	○	○	○

I rate my sleep as ____ (1 = very bad, 10 = very good)

1	2	3	4	5	6	7	8	9	10	prefer not to say
○	○	○	○	○	○	○	○	○	○	○

Please indicate how many hours you sleep as well as when you go to bed and when you wake, including whether AM or PM.

I sleep ____ hours,	
mostly from _____	
to _____.	

Appendix J

Waterloo Unusual Sleep Experiences Questionnaire- VIIIa

Sometimes when falling asleep or when waking from sleep, I experience a brief period during which I am unable to move even though I am awake and conscious of my surroundings.

Please indicate how frequently you experience this:

- ○ Never
- ○ Once
- ○ Several times in life
- ○ Several times in a year
- ○ Monthly
- ○ Weekly
- ○ Several times a week
- ○ Prefer Not to Say

If you have experienced this, please indicate how intense or vivid this experience is on a scale of 1(vague and suggestive, more like a hint of something) to 7 (a very clear and distinct impression as clear as any everyday experience).

1	2	3	4	5	6	7	Prefer Not to Say
○	○	○	○	○	○	○	○

Appendix K

Consent Letter

Project Title: Adult Sleep and Trauma/Abuse Occurring During and After Childhood
Principal Investigator (PI): Dr. Kathy Belicki (Professor)
Principal Student Investigator: Erin Higgs (MA Student)
Department: Psychology
Brock University: 905 688 5550 Ext: 3873, kbelicki@brocku.ca or Ext: 5261, eh14og@brocku.ca

INVITATION
You are invited to participate in the study: "Adult Sleep and Trauma/Abuse Occurring During and After Childhood". This research is part of a research program looking at different types of deeply upsetting childhood experiences (including sexual abuse or physical abuse or trauma that did not involve abuse) and their subsequent impact on sleep. This study is recruiting those who have experienced such events, whereas another study will recruit those who have not.

WHAT IS INVOLVED
As a participant, you will be asked questions about whether you have experienced abuse and trauma, both before and after childhood, and about your current sleep. This will include checklists that describe very specific abusive and traumatic events, including different types of sexual abuse, as well as physical abuse and traumatic events that do not involve abuse. You may be asked questions that appear repetitive but please be patient as this will allow us to ensure we get it right - it's important to us that we accurately record any experiences you have had. Most people can complete the survey in 20-25 minutes. Upon completing this survey, you will receive a feedback form and we encourage you to keep a copy for your records. At the end of the feedback form, you will find your confirmation code that you should then paste into the space provided on the MTurk page. After you submit the code, a payment of $2.50 will be made within 48 hours, which gives us time to check your code.

VOLUNTARY PARTICIPATION
Participation in this survey is completely voluntary, which means you may choose not to participate or you may withdraw at any time by closing the browser window that contains the survey. If you do this and would like a copy of the feedback form you would have gotten had you completed the study, please contact us. If you withdraw, your data will not be used in our analyses and will be deleted from the database; you also will not be paid. However, as an alternative option, you can complete the survey and receive the $2.50 payment by checking the box "Prefer Not to Say" for any question you would rather not answer.

FEEDBACK
Feedback about this study will be available after August 2016. Participants who wish to receive information about the findings of this study at that time can email Kathryn Belicki at kbelicki@brocku.ca or Erin Higgs at eh14og@brocku.ca.

POTENTIAL BENEFITS AND RISKS
You will be asked several questions about trauma or abuse that you may have experienced in childhood, or have subsequently experienced since childhood. Being asked about such experiences may be upsetting. If this is a stressful period in your life, or for any reason you are feeling vulnerable at the present time, we would encourage you to not participate in this study. If you do participate, you can know that you are helping us increase understanding of the impacts on sleep of different forms of stressful experiences. Through studies like this we can accumulate more wisdom about how to help people who have endured difficult circumstances. Therefore, an indirect benefit of participation is that you are contributing to the broader scientific community and society as a whole.

We would like to remind you of resources that are available in the community, such as the following:

- 911 for immediate emergency help
- Your primary health care doctor/provider
- A local crisis counseling service to be found in the phone book or online. Many phonebooks list crisis numbers on the inside cover
- National Suicide Prevention and Crisis Lifeline (800) 273-TALK (8255) or on the World Wide Web http://www.suicidepreventionlifeline.org/

Please remember that should you change your mind about participating, or find it stressful, you may withdraw from the study at any time by closing the browser window or may decline to answer any question by checking the box "Prefer Not to Say".

CONFIDENTIALITY

The survey is administered through an online survey builder called Qualtrics. On Qualtrics we will only collect information that participants provide (i.e., survey answers). Neither Amazon (MTurk) nor Qualtrics will provide any details to the researchers about the participants that would allow for you to be identified. Although MTurk may store data that indicates whether you have completed this HIT (survey), this information is not linked to your responses. Additionally, to ensure anonymity, participants will be provided a random confirmation code that they can then enter at MTurk to receive compensation for their participation. Thus, all the information you provide is confidential and anonymous. In addition, after the study is completed, all the data that relates to this research will be purged from the MTurk and Qualtrics servers. That said, the Qualtrics survey software program is housed on an US server and is therefore subject to the Homeland Security and the Patriot Act (which, independent of us, could interfere with anonymity).

There are ethical and legal requirements for the reporting of both child abuse and the threat of violence, if that information is provided to us; however, the questions in this survey do not provide the specific detail that would be required for us to make such a report.

Once data is collected by the researcher, the American Psychological Association guidelines require that we keep the electronic data files in case questions about analyses arise after publication. Thus, the questionnaire data will be secured in our university laboratory under password-protected computers. After ten years post publication, the data will be securely wiped off the computers. Moreover, because our interest is in the average response of the entire group of participants, no individual response will be discussed in any written reports for this research. Only group data will be published and/or presented at conferences.

CONTACT INFORMATION AND ETHICS CLEARANCE

This study has received ethics clearance through the Research Ethics Board of our university. If you have any questions or concerns about this study, please email us via the contact information posted at the top of this page. Participants also may contact the Research Ethics Board at Brock University at 905 688-5550 x305 (REB file number 15-208 BELICKI) if you have any questions about your rights as research participants. We urge you to print or save a copy of the consent form for your records.

If you agree to take part in this survey, please click on the "I Agree" tab at the bottom of the screen.
Thank you very much for participating in this research.

- ○ I Agree
- ○ I do not agree to participate

If "I Agree" is selected:

As noted in the consent form, this survey includes questions about whether you have experienced different types of specific, deeply upsetting events including abuse or trauma, either in childhood or since childhood. If your current circumstances are stressful, or if for any reason you are feeling vulnerable, we would encourage you to *not* participate in this study. Please indicate your decision:

- ○ Upon reflection, I would prefer not to participate and wish to exit the questionnaire now.
- ○ I would still like to participate in this study described above. I have made this decision based on the information I have read in the information Consent Letter. I have the opportunity to receive additional details and ask further questions by contacting the researchers or the Brock University Research Ethics Office. I understand that I may withdraw this consent at any time simply by exiting the questionnaire before I am finished.

If "Upon Reflection, I would prefer not to participate" is selected:

Thank you for your initial interest in this study. If you are feeling upset or distressed at this time, we strongly encourage you to make use of a community resource such as the following:

- 1. 911 for immediate emergency help
- 2. Your primary health care doctor/provider
- 3. A local crisis counseling service to be found in the phone book or online. Many phonebooks list crisis numbers on the inside cover.
- 4. National Suicide Prevention and Crisis Lifeline (800) 273-TALK (8255) or on the World Wide Web http://www.suicidepreventionlifeline.org/

If "I would still like to participate in this study" is selected:

To ensure that you are completing this survey, and not a "bot", there are several questions scattered throughout the survey that tell you how to answer. To get paid you need to answer these questions as directed.

We would like to remind you of resources that are available in the community. If you are feeling upset or distressed at this time, we strongly encourage you to make use of a community resource such as the following:

- 911 for immediate emergency help
- Your primary health care doctor/provider
- A local crisis counseling service to be found in the phone book or online. Many phonebooks list crisis numbers on the inside cover.
- National Suicide Prevention and Crisis Lifeline (800) 273-TALK (8255) or on the World Wide Web http://www.suicidepreventionlifeline.org/

Appendix L

Feedback Questionnaire

Research can always be improved and we have found the participants' feedback is really helpful. We'd be grateful for any wisdom you can share with us about any aspect of this study, or any of the questionnaires.

General Comments

I enjoyed participating in this study

Not at all	A little	Somewhat	Quite a lot	A lot
○	○	○	○	○

I think this study may produce helpful or valuable results

Not at all	A little	Somewhat	Quite a lot	A lot
○	○	○	○	○

I found it upsetting to participate in this study

Not at all	A little	Somewhat	Quite a lot	A lot
○	○	○	○	○

Appendix M

Feedback Letter

FEEDBACK LETTER

NOTE: THE CODE YOU NEED TO ENTER ON MTURK IN ORDER TO GET PAID WILL BE GIVEN TO YOU AT THE BOTTOM OF THIS LETTER

Project Title: Adult Sleep and Trauma/Abuse Occurring During and After Childhood
Principle Investigator (PI): Dr. Kathy Belicki (Professor)
Principal Student Investigator: Erin Higgs (MA Student)
Department: Psychology
Brock University: 905 688 5550 Ext: 3873, kbelicki@brocku.ca or Ext: 5261, eh14og@brocku.ca
Research Ethics Office at Brock University at 905 688 5550 x3035
REB file number = 15-208 BELICKI

In this study we are interested in the relations of childhood sexual abuse versus childhood physical abuse versus non-abusive trauma versus no abuse or trauma to different types of sleep problems in adulthood. Prior studies have found that people who have experienced upsetting childhood events tend to generally have poorer sleep. This study improves on that research by examining a wide range of different sleep problems. We anticipate that different childhood experiences will have different impacts on sleep. In addition, prior studies have tended to study small groups of people and by using MTurk we are able to get a much larger sample, as well as a sample that represents a greater cross-section of the population. Finally, we improve on prior research by considering some of the mechanisms that may cause a person who has had upsetting experiences in childhood to have problems with sleep in adulthood. For example, we will examine the role of health-related behaviours such as healthy eating, exercise, and good sleep habits.

Feedback about our findings will be available after August 2016. Participants who wish to receive information about these at that time can e-mail Kathryn Belicki (kbelicki@brocku.ca) or Erin Higgs (eh14og@brocku.ca).

In the meantime, if you have any questions or concerns about this study, please contact us. You may also contact the Research Ethics Office at Brock University at 905 688-5550 x3035 (Research Ethics Board file number: 15-208 BELICKI) if you have any questions about your rights as a research participant.
If you are feeling upset or distressed at this time, we strongly encourage you to make use of a community resource such as the following:
911 for immediate emergency help
Your primary health care doctor/provider
A local crisis counseling service to be found in the phone book or online
National Suicide Prevention and Crisis Lifeline (800) 273-TALK (8255) or on the World Wide Web http://www.suicidepreventionlifeline.org/
At the bottom of this page you will find a confirmation code. You will use this code to claim your payment for the HIT (survey) back on MTurk. You will be paid $2.50 within 48 hours, which gives us time to check your confirmation/verification code.

Thank you very much for taking the time to be part of this research.

Your MTurk completion code is:

Appendix N

Certificate of Ethics Clearance

Brock University
Research Ethics Office
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Social Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE:	3/18/2016		
PRINCIPAL INVESTIGATOR:	BELICKI, Kathy - Psychology		
FILE:	15-208 - BELICKI		
TYPE:	Masters Thesis/Project	STUDENT:	Erin Higgs
		SUPERVISOR:	Kathy Belicki

TITLE: Adult Sleep and Trauma/Abuse During and After Childhood

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW Expiry Date: 3/31/2017

The Brock University Social Science Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 3/18/2016 to 3/31/2017.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 3/31/2017. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at http://www.brocku.ca/research/policies-and-forms/research-forms.

In addition, throughout your research, you must report promptly to the REB:

a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Kimberly Maich, Chair
Social Science Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.